THE

AMERICAN JOURNAL

OF THE MEDICAL SCIENCES

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Contributors who wish their articles to appear in the next number are requested to forward them before the 1st of November.

Liberal compensation is made for all articles used. Extra copies, in pamphlet form with cover, will be furnished to authors in lieu of compensation, *provided the request for them be made at the time the communication is sent* to the Editor.

The following works have been received:—

Ueber rhinoscopisches Operiren. Von Dr. Arthur Hartmann, in Berlin.

Die Wirkungen den Quebrachodroguen. Von Dr. F. Penzoldt. Erlangen, 1881.

Ueber den Befund einer Excessbildung an der Trachea eines 41 jährigen Mannes. Von Dr. John N. Mackenzie, aus Baltimore.

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Des Tubercules de l'Estomac spécialement chez les Enfants. Par le Dr. H. Cazin. Paris, 1881.

A Case of Abscess of the Liver; Aspiration; Recovery. By George F. Duffey. M.D., Dubl. Dublin, 1881.

The Means of Determining Causation in Insanity. By Wm. R. Huggard, M.D.

Transactions of the Liverpool Medical Institution. Session 1880-1881. Inaugural Address. By Reginald Harrison, M.D.

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On the Surgical Anatomy of the Sheaths of the Palmar Tendon. By ROSWELL PARK, M.D. Brooklyn, 1881.

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Ethylene Bichloride as an Anæsthetic Agent. Are all Anæsthetics Dangerous which contain Chlorine, Bromine, or Iodine? Convulsions due to Depression of Spinal Reflex-Inhibitory Centres. By EDWARD T. REICHERT, M.D.

A Report of 20 Years' Experience in the Department of Physical Education and Hygiene in Amherst College. Amherst, 1881.

The Quality of Mental Operations debased by the Use of Alcohol. By T. L. WRIGHT, M.D. St. Louis, 1881.

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Proceedings of the Medical Society of the County of Kings. July, Aug., Sept., 1881.

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Nordiskt Medicinskt Arkiv, 1880, Tredja, Häft., 1881, Andea Häftet.
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Annali Universali di Medicina a Chirurgia, Nov. 1880, to Agosto, 1881.
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Royal London Ophthalmic Hospital Reports, vol. x. part ii.
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Indian Medical Gazette, Dec. 1880, to Aug. 1881.
The Liverpool Medico-Chirurgical Journal, including the Proceedings of the Liverpool Medical Institution, No. 1.

The usual American exchanges have been received; their separate acknowledgment is omitted for want of space.

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THE

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Article I.

The Nervous Symptoms of Lithæmia. By J. M. Da Costa, M.D., Professor of Practice of Medicine and of Clinical Medicine at the Jefferson Medical College, Philadelphia; Physician to the Pennsylvania Hospital.

Among the subjects which have been of late more clearly recognized is that of lithiasis or lithæmia. Able researches have done much, decidedly, to direct the attention of the medical mind to it, and the outcome is that it is now distinctly known that a state exists which is closely allied to gout, a half-gout that does not bring with it the inflammation, pain, and obvious swellings of the gouty paroxysm, but which works more silently, is characterized by the abundance of lithic acid or lithates in the urine, frequently coexists with signs of ill-assimilation of food, and with aches and pains unaccompanied by any perceptible changes of the aching part. Hepatic derangement is also often found; and from this end of the chain the links are stretched through many vague, almost nameless, symptoms to outbreaks of true gout, or to structural change in heart, vessels, and kidneys. But it is not my object to discuss this relationship, and the mode of progress, nor the striking organic changes that are wrought. I shall confine myself to the less obvious, less known results which show themselves in the nervous system. This matter has long engaged my attention, and the more I examine it, the more I see these obscure phenomena becoming clear and demonstrating for themselves their true causation.

The first nervous symptom, connected with lithæmia, that I shall describe is *vertigo*. It is astonishing how many cases of vertigo turn out, on close investigation, to be thus caused; how persistent are the symptoms, how grave the apprehensions, until their true source is made out and the treat-

ment based on it; and how gratifying then the results of the treatment. Cases go on for years, some of them weighted down with the suspicion of organic cerebral mischief, more especially of tumour of the brain; lives are wrecked by the enforced abandonment of pursuits; the remedies employed are hurtful rather than helpful, until the hidden cause of the malady is discerned and by steady perseverance removed.

I will, by way of illustration, record three such cases of grave aspect and long standing.

CASE I.—A physician, 35 years of age, practising in a malarial district, himself a malarial subject, but not for some time affected with any distinct malarial outbreak, consulted me for violent attacks of vertigo; so violent and repeated that they interfered with the exercise of his profession; often was he obliged to lie down in his carriage, and at times staggered so in going to a house that, leaning against the front door for support, he would fall into the entry when the door was opened. He was rarely a day without an attack, although some were light; at times they were twice or thrice repeated in the twenty-four hours. His memory began to fail him; he was especially confused as to names, and was liable to use wrong words like an aphasic. At times a dull headache existed, but headache was on the whole neither a constant nor a prominent symptom; his vision was less acute than formerly. These symptoms had been going on markedly for a year, uninfluenced by quinia and other remedies, which he at first took under the belief that the disorder was malarial. Efforts to continue his professional duties increased his distress. He finally abandoned work, fully persuaded that he had an organic disease of brain or spinal cord, and alternating only in opinion between cerebral tumour, as he thought of the violent vertigo and of the headache, and locomotor ataxia, as his mind dwelt on the uncertainty of gait and the attacks of shooting pains in the limbs which every now and then happened.

When examined by me, I found no alteration of sensibility or of motion; the tongue was slightly coated at the back, the bowels were regular; the conjunctiva rather muddy, and with the faintest yellowish tint; no marked dyspeptic symptoms existed, or enlargement of liver or spleen, though the liver dulness was, perhaps, a little more extended than normal. The pulse was compressible, and occasionally lost a beat; there was no cardiac murmur. The appearance of the patient was that of distress, but not of anæmia. The joints of the fingers were somewhat tender on pressure. The urine was scanty, of high specific gravity, free from albumen, but loaded with lithates.

It was difficult to persuade the patient that he was not affected with a hopeless disease; that his symptoms were those of lithæmia, produced by overwork and the disordered state of the liver due most likely to malarial poison. He yielded reluctantly to the view of trying a strict diet, resting from work, exercising in the open air, and using alkaline purgative waters, followed by a course of small doses of arsenic. But he was glad he had yielded when health slowly, but steadily and fully, returning showed him the advantage derived from his submission.

The case I am about to relate was of much longer duration, and the time that has elapsed since the last attack shows how complete was the recovery.

Case II.—A gentleman, 48 years of age, fond of intellectual pursuits, and leading the life of a student in addition to bearing the cares and anxieties of the responsible direction of heavy interests, has been at least for twelve years subject to attacks of vertigo, which distress him and demoralize him. Some years since he never passed a month without them; they come, when feeling well, or with but little premonition, simply that of a slight dyspeptic state; they come when on a strain, and when taking relaxation, though much more generally under the former than under the latter circumstances. The attacks are of about a minute's duration; he has had them at night awakening him out of his sleep; they are objective, and followed by a dull headache, which does not last longer than a day and sometimes only for a few hours. He is very gloomy after them, and for years his life was haunted by the idea that he was becoming an epileptic. This view was seemingly confirmed by rapidly passing spells, during which his mind was a blank and he would stagger in his gait, and he eyed with keen suspicion any companion in his walk, fearing that the dreaded secret was at last disclosed. Irregularity of the heart I found to be very common with him, the pulse some days intermitting every fourth beat, and on others only every twentieth. When the irregularity was most marked, these passing attacks of oblivion happened most decidedly. The intellectual faculties were always acute, but long spells of listlessness, requiring strong will power to force himself into exertion, were not infrequent. Dyspepsia occurred occasionally, especially of the acid type, but was not a marked symptom; the urine often deposited lithates, was of specific gravity ranging from 1020 to 1024, was free from sugar and albumen, contained lithates in abundance, and at times oxalates. The eye ground, examined by an ophthalmologist, was pronounced to be normal; it is right to add that the examination was made when there had not recently been vertigo. Slight sallowness of the skin and elevation of temperature, not exceeding one degree, were occasional symptoms, and joints of right hand at times tender on pressure, pain in the toes, and so-called rheumatism in the leg, some stiffness in walking, were also at long intervals observed.

Lithæmia existed in the family; the father had clearly suffered from similar symptoms, including the vertigo; a brother had the uric acid diathesis very marked, and had passed renal calculi of uric acid.

A system of active exercise, shower baths, regulated diet, produced very good results, so good that the attacks of vertigo happened only once in seven or eight months, while the dreaded slight suspensions of consciousness passed away altogether. But the cure was completed by a European trip, and the taking, while in Europe, of a course of Kissingen water. Two years and a half have elapsed since the last vertiginous seizure, and although there are still occasionally lithæmic symptoms, as regards the pain in the joints, and their soreness on pressure, the nervous symptoms have vanished; the action of the heart has become quite regular, the future seems as bright and promising, as before it was overcast and gloomy.

In the cases just described, the symptoms of gastric derangement were so slight and inconstant that they scarcely can be said to have been features of the disorder. I will now cite one, remarkable also for its seeming gravity, in which, however, early in the case at least, gastric symptoms were marked.

CASE III.—A gentleman, 38 years of age, tall, of fine physique, of nervous temperament, born of a family in which gout has been long hereditary, father, grandfather, and maternal uncles having been great sufferers by it, was in excellent health until October, 1878. He is temperate in his habits, fond of all outdoor exercises, an active walker and rider. In the autumn of that year, feeling the effects of the exhausting heat, he drank for a time Burgundy, but abandoned it when he began to perceive that it did not suit his digestion, and occcasioned some aching in the joints. While regaining his usual condition, he was exposed to the vapours of turpentine in a newly painted house; an attack of vertigo resulted. From this time on for three months his life was a very miserable one. Four or five attacks of vertigo were often of daily occurrence, and he woke up with them at night, the floor and the bed seeming to dance around vigorously; he himself, however, never appeared to move, in other words, the vertigo was always objective. An attack lasted, it was thought, about two to three minutes; it was often followed by clammy sweat and by dull headache. The worst ones only were attended with sick stomach, or with the subsequent vomiting of a glairy and intensely acid mucus. A symptom as annoying as the vertigo was the staggering gait frequently produced; while walking, he would sway so as to have to cling to a lamp-post, and he, one of the most temperate of men, had several times to undergo the mortification of being taken for an inebriate.

He had no persistent headache, was greatly troubled with impaired eyesight; was obliged almost to desist from reading and from his ordinary pursuits; but bore his trials with unflinching courage. The heart acted normally, with an occasional intermission; he had at times shooting pains in his legs, and aches in the knuckles; the bowels were regular; the urine was habitually scanty, of specific gravity 1024, filled with urates, and occasionally with little cayenne pepper grains of uric acid. The gastric symptoms were in the first month or two very pronounced; they were of the form of a gastric catarrh with much acid dyspepsia. The impaired eyesight has been alluded to. An expert who examined the eyes carefully, pronounced them astigmatic, but stated that in addition there was decided enlargement of the retinal veins, a sort of varicose condition, and a spot of intense congestion in the right eye explaining the absolute blindness to objects in the lower right-hand quarter of the field of vision. In the left eye there was some varicosity of the veins, but no marked congestion; in neither eye-ground was choking of the disks found.

Another most distressing symptom was numbness of the left side, chiefly of the leg, sometimes of the arm and the side of the face. It bore no relation to the vertigo, was apt to occur in paroxsyms of from three to five minutes' duration, during which the sensibility of the skin was somewhat impaired, at other times the æsthesiometer detected no abnormal condition.

Some improvement took place under treatment, especially under the strict diet, the use of small doses of Hunyadi water in the morning, and of corrosive sublimate between meals. The gastric symptoms were certainly much benefited, the vertigo happened less frequently, yet scarcely a day passed without some attack, even if slight. A sea-trip was then decided on; and he sailed for Europe in January, 1879. The effect was admirable and immediate, at least, on the vertigo. He had but one seizure, which occurred while passing through Paris, at the end of January. But his other symptoms did not at once subside. On the contrary, headache, which had been a very inconstant, almost absent symptom, while

here, became a prominent one; and more or less dull pain in the head with not infrequent attacks like those of nervous sick headache were common; the swaying, too, by no means ceased, and was, like the headache, for a time aggravated by visiting the picture galleries of Northern Italy.

Pains in the limbs, cramps and aches, even slight swelling in the knuckles, with uric acid deposits in the urine, also happened from time to time. Sugar in any abundance, malt extract, and all wines, except the light red wine of the Riviera, made these symptoms worse, or at once developed them, if they had been absent. Eschewing all wines and great care in diet, especially with reference to saccharine substances, much exercise in the open air in some of the health resorts of the south of France, produced amelioration so decided that he returned home in the autumn well to all appearances, although still a little troubled with the headache and the swaying in walking. Since January, 1880, these have passed off entirely, and while careful about taking enough exercise and about his diet, he is as well as ever he has been. His eyes, too, have greatly improved; when under active exercise and free from care, he can read without glasses, and has had at times glimmering of vision in the spot in the right eye which seems deprived of it.

Reviewing the features which these cases have in common, and taking into account many other instances which I have seen, what I shall call *lithæmic vertigo*, may be, I think, thus described. It is a giddiness frequently repeated; often there are several attacks daily for a few days, and then there is a much longer interval; it may occur at night. It happens irrespective of exertion, although long continued fatigue, especially in reading and writing, excites it; so does mental worry. But anything that aggravates or induces the lithæmic state develops it most promptly. Special articles of food do so; and I have had patients in whom a few glasses of hock, or a single glass of Burgundy or champagne, are sure to cause it the next day. The vertigo is objective, not subjective,—objects seem to whirl around the sufferer, not he himself to move. The giddiness is not associated with loss of consciousness, or this is so temporary that the patient is able to retain his position or speedily to regain it. Still he has to hold on for support to surrounding objects, and I have known him brought down on his knee before it is over. From the alarm and distress which attend it, it is very difficult to form an idea as to its duration. Notwithstanding the exaggerated statements made by the sufferer, to whom the seizure seems terribly long, it is safe to say that it rarely lasts more than a minute or two, and frequently less than a minute. It may come on without warning, or be preceded by a sense of emptiness of the head, by specks floating before the eyes, by dimness of sight. When it has set in, sudden change of position is apt for the next few days to develop it at once, although, perhaps, this is not more marked than in any form of vertigo. It may or may not be followed by headache; generally it is only followed by a sense of discomfort in the head, or by a dull ache of short duration, and, as in Case III., it may be noticed that when the headache in lithæmia becomes a marked symptom, the vertigo is infrequent.

When often repeated, it produces effects on the special senses. Sight is less acute, the field of vision is limited in size; letters look blurred, and there may be inability to see more than two or three letters in a word, or double vision may occur. One eye, or part of one eye, may be temporarily blind; and the ophthalmoscope detects marked congestion, especially fulness of the veins. When no attack has happened for some time, the eye-ground, as in Case II., is found to be normal. Long continued and frequently repeated attacks may give rise to some persistent changes, though never to choking of the disk. It would be unfair to leave the impression that these changes are all the result of the vertiginous seizures. In part, at least, they belong to the lithæmic state itself, and may be caused by it. But the whole matter is new and not worked out; and I invite the attention of ophthalmologists to this promising subject.

The sense of hearing is sometimes impaired for a day or two, and buzzing in the ears is complained of. These phenomena, too, may follow attacks of vertigo, or occur when the patient is only markedly lithæmic, and has not been dizzy.

I have in the cases described alluded to the momentary suspensions of consciousness, the sensations of lightness in the head, with a dark shade passing over the eyes, which are, in my experience, very common, and are dreaded by physicians especially, when afflicted with the disorder, as the precursors of epilepsy. The sense of terror and of fear occasioned is quite inconceivable to one who has not heard these attacks spoken of by a victim. They happen in those who at other times have had distinct vertigo; they are not at the time combined with giddiness, but produce a staggering or swaying, from which recovery is so quick that the disturbance mostly passes unperceived. Again, uncertainty of gait may take place for a long period without any of these signs of brain disturbance. In Case III. it lasted for a year after the vertigo had ceased.

As regards the cause of the vertigo, it is likely that the disorder is produced by the impure lithæmic blood. Whether this acts on the vaso-motor nerves and through them on the cerebral circulation, or primarily on some nerve-centre, must remain for the present a matter of pure speculation. It would not be difficult, following the ingenious reasoning of Woakes, concerning stomach vertigo, to connect the disturbance through the pneumogastric nerve and the lower cervical ganglion with the vertebral artery supplying the labyrinth and adjacent structures. But we must then assume as certain that a disturbance of this is always the cause of giddiness, and that the lithæmic process is invariably connected with a fault in the liver.

Gastric vertigo has just been mentioned, and doubtless it will be thought that the symptoms described are those of gastric vertigo. So they are in many respects; except that, for the most part, there are no gastric symptoms, or but passing gastric symptoms in lithæmic vertigo, while the

evidences of the lithæmic state are the marked features, or soon become so. Indeed, the error has been the other way; lithæmic vertigo has been confusedly included with gastric vertigo, from which we must learn to separate it. This is best done, as just indicated, by dwelling on the comparative absence of the stomach symptoms, and on the evidence presented of lithæmia. But there are unquestionably mixed cases, which it is not easy to analyze.

Headache is not, on the whole, a prominent symptom of lithæmia; that is, persistent headache is not. A dull feeling in the head, especially frontal, much more rarely occipital, happens at times for a day or two, if the digestion be specially disordered; or occurs as a morning headache, or, as already mentioned, for a few hours after an attack of giddiness. But severe acute periodical headaches of neuralgic type are common. They are very much like migraine, except that the bilious vomiting and signs of gastric disorder are far less prominent. They are localized, are increased by noises and by motion, and are frequently accompanied or followed by a heavy deposit of red sand in the urine. This is the way the attack relieves itself, and it suggests a strong analogy with what has often been noticed, that gout in the joints and migraine are prone to happen in the same person, the violent headache ending when the gouty swelling begins.

Neuralgia is a very common complaint in lithæmic subjects, and there is no nerve in the body that can ache which is exempt. Brachial neuralgias with pain shooting down the forearm to the tips of the fingers, intercostal neuralgias, sciatic neuralgias, are very common; neuralgia of the tongue happens; and in women neuralgia of the breast is not rare. The only neuralgia which I have found infrequent, is the one which might be supposed to be the most frequent, that of the fifth nerve; still it, too, may be encountered. Women are, I think, more subject to lithæmic neuralgia than men; we do not absolutely meet with more cases than in men, but this is because lithæmia affects so many more men than it does women.

The sciatic neuralgia may seize upon one or both nerves. There are often paroxysms of pain of three or four days' duration, and lulls of at least as long. This may go on for several months unless checked by treatment for the constitutional state. Sometimes the attack relieves itself by gravel in large quantities being passed. When the disorder is protracted, it may well be, in these lithæmic neuralgias, that the uric acid, irritating and perhaps being deposited in the nerve sheaths, leads to a secondary neuritis. The comparative infrequency of trifacial neuralgia has been alluded to. What is generally called facial neuralgia are cases like this, which at the same time illustrates the form of neuralgic headache above mentioned.

CASE IV.—A professional man, 48 years of age, portly in appearance, consulted me with reference to violent attacks of neuralgia and vertigo. The attacks of neuralgia frequently happened every day for some time. They are not, however, in the course of the fifth nerve, and it is more correct to

describe them as severe lancinating, paroxsymal headache, the pain felt on both sides of the head, especially of the forehead, followed by a little general soreness of these parts, but without localized tenderness in the trifacial. At times there are violent attacks of gastralgia, as violent as the head pains, and apt to take their place. He often has sleepless nights, gets up frequently to pass water, and his restlessness makes him an early riser. He is not a dyspeptic, except that he is at times annoyed with acid eructations; the tongue is clean. The urine is voided in full, rather large, quantities. It has an acid reaction, a specific gravity of 1014, no albumen or sugar. Examined under the microscope, there are urates, and also a large amount of free uric acid, with some epithelium. The pulse is compressible, about 75, easily influenced by emotion and fatigue; the first sound of the heart is short; the second very distinct. The vertigo and the headache are the only cerebral symptoms; the latter is not constant, but disappears for weeks and then returns in those violent outbreaks like neuralgia. These are sometimes terrible, and last, with their fierce exacerbations of several hours' duration and their remissions, for one to two weeks at a time. A half pint of hock will at once provoke the frightful headache, and frequently at the same time pain in the big toe. Aconite and morphia, salicylic acid, but particularly iodide of potassium and colchicum, have relieved the head pains. There are depression and irritability of temper, and want of energy, but these are far from constant, and occur irrespectively of the pains. In bracing mountain air, and taking exercise, he is always well. The attacks of vertigo have been very severe, although they are not frequent; they are chiefly morning attacks, most apt to occur on first rising. A striking feature of the case is the inability to keep warm, and the coldness of the extremities; but this is largely subjective. Yet, the state of the skin is not quite normal; the sensibility is not acute. The two points of an æsthesiometer on the finger tips are not sharply felt, nor correctly appreciated when at all close together. There is the clearest history of hereditary gout. Father, grandfather, great-grandfather, and the mother's father, all had been gouty. He himself has never had an attack.

Under systematic skin friction, moderately active exercise, occasional saline purgatives, restricted diet, mild alkaline diuretic waters, this gentleman improved greatly, and headache and vertigo were strikingly influenced. Oxide of zinc, two grains three times daily, was also taken for a time, and it was thought with decided benefit.

The next case illustrates a most violent form of intercostal neuralgia, finally cured by remedying the lithæmic state.

CASE V.—A physician, 33 years of age, of good constitution and general health, except repeated attacks of left-sided, trifacial neuralgia, occurring every week or ten days since childhood, and expending their force on the supra-orbital branch. Never had malaria, syphilis, acute rheumatism, or gout. Is a moderate eater, and temperate in his habits, using occasionally a little whiskey after dinner and supper, at no time exceeding three ounces in all. There is no hereditary disease, his father is living affected with shaking palsy. Practising in a mining district, there was much hard work and exposure, but his health was fairly good until his return to the city after a three years' absence. Soon, he began to be attacked with what was at first looked upon as pleurodynia on the left side; it was finally relieved by blistering and by a course of iodide of potassium

and cod-liver oil. For a year or two headaches happened, also generally relieved by the iodides.

In the spring of 1878 he first felt a burning aching pain between the shoulders, extending to the occiput. The pain increased gradually, involved a considerable portion of the left side of the chest, which became sore, and very tender spots could be distinctly made out in the course of the intercostal nerves. There was loss of appetite, and of flesh, constipation, and profound melancholy.

The salicylates, quinia, colchicum, the iodides were taken without relief; nothing did good but a trip to Florida of three months, and exercise in the open air; the pain and all the other symptoms disappeared. But on returning home they soon came back, the melancholy was intense, the chest pains were most violent. These were relieved by the thermo-cautery applied along the spine over the site of exit of the aching nerves. Yet the relief did not last, and when I saw the patient about two months afterwards, he had severe pains and aches in the dorsal and pelvic girdles. The pains were acute and in paroxysms, there were distinct tender spots to be made out in the course of the nerves; the intercostal trunks previously affected were only slightly disturbed; the pain at times shot along the sciatic nerves of one or both legs, and was combined with very considerable diffused muscular soreness. Not the least evidence of stiffness, swelling, or redness of the joints existed, and no fever. The body pains, which were aggravated in paroxysms, were worse in the evening and early morning and in damp weather. They often ceased when attacks of trifacial neuralgia happened. There was very slight dyspepsia, a clear tongue, some constipation, only trifling loss of flesh, but foreboding of evil, with refined self-torture, and a melancholy as great as I have ever met with. The mental faculties remained good, except some impairment of memory; reasoning was keen on the false facts which the gloomy self-inspection furnished. The heart was slightly accelerated, at times irregular, the first sound short, lacking weight, the second sharp. He passed but little over one pint of urine in twenty-four hours, of specific gravity 1023, free from albumen and sugar; acid, containing a great excess of urates. The urinary examination repeated several times gave much the same results, specific gravity ranging from 1023 to 1028, abundant urates, uric acid forming readily and in abundance, but only after urine acidulated with nitric acid was allowed to stand, dumb-bell and octahedral oxalates in moderate amounts.

I placed this patient on a diet of vegetables, fish, stale bread, and white meats, even these only in moderation; I forbade all stimulants; I insisted upon a certain amount of daily exercise and skin friction, and directed him to drink Poland water freely, to keep the bowels soluble, and to take oxide of zinc, two grains three times daily. After about a month of this treatment he reported himself very much better. In place of passing only a pint of urine daily, he passed three pints, of specific gravity 1017; he had hardly any dyspepsia, his tongue was clean. There had been some attacks of neuralgia, and a little pain in the great toe joint, worse before a rain storm, but they had not been very severe. For one attack of sharper and more protracted character, he took large doses of quinia with the same negative results as on former trials. Colchicum did much more good. He remained comparatively well, his spirits rallying with his improving health, until early in April, when he had a terrible seizure of left-sided intercostal neuralgia. Opium inter-

nally, hypodermics of morphia, and of morphia and atropia, cannabis, and chloral gave but very temporary relief; the attack had been going on for nearly two weeks under this treatment, when I directed him to take $\frac{1}{100}$th of a grain of aconitia. He took three doses in twenty-four hours, it produced its physiological effects. The pulse sank to 52, was slightly intermittent, a feeling of numbness spread all over the body, and the neuralgia vanished. For a month afterwards he was entirely free from pain, pursuing his treatment with zinc, subsequently with small doses of arsenic, but always drinking freely of diuretic alkaline waters, using natural purgative waters from time to time, and keeping up the strict diet. The arsenic was not long continued, as it did not seem to suit his digestion. He has had but one bad attack of intercostal and dorso-abdominal neuralgia since. Aconitia influenced it, but not as decidedly as in the first trial; hypodermics of morphia and atropia relieved the pain, and the attack, much shorter than usual, lasting only three or four days, was broken up by free purgation with gamboge. At its height and at its decline, the urine, as usual in these seizures, was filled with heavy sandy deposits. The patient is now well, he has been to the seashore; he has gained flesh. He is careful in his diet, takes no medicine, and is cheerful and happy.

One of the most common forms of lithæmic neuralgia is *gastralgia*. It does not differ in its manifestation from ordinary gastralgia, except that it is associated with evidences of lithæmia, and that it is very apt to alternate with other neuralgias. It goes on unrelieved, until its source is detected and removed, and then yields entirely, to return perhaps only at long intervals, if at all, unless depressing care, work, or indiscretions in diet actively re-develop the constitutional fault which underlies it. It leads to emaciation, and is the source of much anxiety; and many is the case I have seen of supposed ulcer or cancer of the stomach which was lithæmic and recovered.

Here is a typical instance, selected from many.

CASE VI.—A gentleman, 40 years of age, had been for two years a great sufferer with violent and oft repeated attacks of cramps in the stomach. While for six months in southern Europe, the disorder almost ceased. The pain now is very severe, lasting, with slight remissions, for about an hour; it is sometimes started by eating, but it is neither necessarily caused nor made worse by taking food. The tongue is clean; the digestion, except for the pain, good. During, and more particularly after, an attack of pain, soreness at the epigastrium is noticed; no tumour can be felt; the abdominal aorta throbs a great deal; there are no murmurs. The patient has been thought to be labouring under gastric ulcer, while abdominal aneurism has also been diagnosticated. There is an old, but not marked history of malaria, none of syphilis. Considerable loss of flesh has happened. At times aching pains in the fingers are complained of. The urine is very acid, high coloured, free from albumen, but full of lithates, and frequently deposits heavy red sand, and shows in abundance crystals of uric acid. I made the patient watch these deposits, and found that their occurrence almost invariably coincided with, or followed the attacks of gastric pain, and when these were frequently repeated and decided, the appearance of the urine could be correctly predicated. A care-

ful diet, with a good deal of milk food, rest from laborious pursuits, saline aperient waters, and the steady use for about one month of the citrate of lithium, broke up the painful disorder. A course of arsenic afterwards completed the cure.

Cramps in the legs and *muscular twitchings* are often met with in those suffering from lithæmia. The former are apt to come on at night, and are very annoying and painful. They particularly affect the gastrocnemii muscles, and occur much more often in winter than in summer. In one of my patients cramp under the inner surface of the instep is as frequent as in the calf muscles; in another, muscular twitchings of the face are also produced when the lithæmic state is marked. Irregular choreic movements I have also seen in children, and they would be very much more common were the disease more common in childhood. Yet if we look for it we may find it oftener than we suspect. I have now under observation a bright young fellow of eleven, inheriting gout through several generations, with most marked lithic acid diathesis and nervous symptoms; the tendency to irregular muscular movements is only kept in check by rigid attention to diet. *Pains* and *perverted sensations* are also among the symptoms of lithæmia. Pain in the fingers, in the feet, without being necessarily associated with aching joints, pain in the tendo-Achillis, in the breasts, near the shoulder blades, and in women, at the coccyx, pains in the legs, thought to be rheumatic, and attended with some muscular soreness and stiffness of gait, are often encountered; so are burning sensations of the tongue, and burning of the palms and of the soles. These localized flushings in hands and feet are attended with a very slight elevation of temperature. The general temperature is but little influenced by lithæmia; I think never raised more than a degree to a degree and a half, even during the general hot spells, of which there may be complaint. One of the most singular abnormal sensations is that of great fulness and rather pleasant warmth in an entire leg from the knee down, not accompanied by any sense of burning of the skin. All these perverted sensations are not persistent, but they recur often.

Anæsthesia is also a symptom of lithæmia, though not a common one. I have never found it very extended, but generally localized to an arm or leg, or part of the thigh, or, what is not unusual, on corresponding parts of both arms and legs. It may affect the face and the lips, and those in whom it happens who have headache as a more than ordinarily prominent symptom, have told me that the disordered sensation was on the side opposite to the headache. The sense of numbness is greater than the actual loss of sensibility is found to be. Still, there is some loss of sensibility, less keenness of appreciation of sharp points, inability to distinguish the two points of the æsthesiometer with readiness. One of my patients tells me, that when suffering from the numbness in the lips he can bite the lips without feeling it. The numbness may be associated with formi-

cation or a sense of pricking. It is a persistent symptom in so far that while the lithæmic state lasts, it remains where it has been noticed, but it dwindles down at times to very little, and increases markedly at others. Free purgation always benefits it greatly; faradization with an electric brush improves it, and it will gradually disappear under strict diet, exercise, and remedying the lithæmic state; but recurrences are not uncommon.

In this case it was very marked:—

CASE VII.—Miss S., age 38, inclined to corpulency, has been under my observation for eight years, originally for blood-spitting following an attack of acute bronchial catarrh and pulmonary congestion. She has suffered a great deal from torpor of the liver, at times from acid indigestion, and frequently passes urine loaded with lithates. Aching in the joints and shooting pains in the limbs are also common, and nervousness and sleepless nights. But the most singular feature of her case is a perverted sensibility of the skin, a sense of pricking associated with great numbness. This is limited to the hands and forearm, it may be on one side, it may be on both. There are times when it is absent for months; it is apt to come on in spells lasting in a very decided manner from four to six weeks, and during its continuance, the symptoms of acid indigestion, of sluggish action of the liver, of uric acid deposits in the scanty urine, of aching hands, are apt to be at their height; or it supersedes, as it often long outlasts, these. A blue pill, followed by salines, always strikingly moderates it. It is not a purely subjective sensation; for when very marked an æsthesiometer shows defective tactile sense; when light, it is difficult to say that there is any lost cutaneous sensibility. There is no disorder of the heart or uterine functions; the urine, except the lithates or crystals of uric acid, presents nothing abnormal. Care in diet has had a decided influence on the troublesome symptom, the greatest relief has followed the use of laxatives, and the administration of citrate of lithium, which has increased the flow of urine and altered its acid character.

Other nervous symptoms are sleeplessness, sensitiveness to sounds, great susceptibility to odours. The *sleeplessness* is a very distressing symptom. Bromides and chloral have a good temporary influence on it, but it is best removed by purgatives and diet. Wine generally aggravates it; and so do such articles of food as readily induce the lithæmic state. The *sensitiveness to sounds* is especially annoying in those who have headaches, and loud sounds add not only to these, but provoke or increase the irritability of temper. Undue *susceptibility* to odours shows itself on many occasions. The odour of the magnolia causes headache; that of turpentine is mostly very unpleasant, and I have known it to excite headache and vertigo. A certain *nervousness* which may pass into hysteria is also among the symptoms of lithæmia. I have twice seen in man hysteria from lithæmia; and I am very certain that the hysterical symptoms of women no longer in their youth, and which are attributed to nervous break downs, to menstrual disorders, to approaching change of life and the like, are often really of lithæmic origin, and curable by the treatment which removes the constitutional cause. There are also among the rarer mani-

festations of lithæmia *reflex pains and aches*, for which there is nothing to account, or which are only partially explained by the direct action of the acid urine. To the former belong the pains and sensitiveness in the region of the heart, while this organ shows nothing abnormal except perhaps an occasional intermittency; a distressing itching of portions of the skin, nothing being visible. The latter is illustrated by this case:—

Case VIII.—G., age 35, a man of extremely nervous temperament, son of a father with lithæmic symptoms; has had a great deal of care falling on him early in life. Has suffered much from mental depression and almost hysterical outbreaks of nervousness. Sleeplessness and irritability of the heart were also among the symptoms; all of which were aggravated by worry and relieved by long absence from home, especially in mountainous regions, and by horseback exercise. Vertigo has happened occasionally, early in the case, which has been going on for five or six years; but it has never been a marked feature. Early in the case, too, gastric symptoms, coated tongue, some acid indigestion were observed, and this led to the long trial of an almost exclusive milk diet for several years with the result of influencing the digestive condition favourably, but having little effect on the nervous phenomena. Of late the digestion has been good; attacks of flatulency and of enteralgia happen, however; the tongue is only at times coated, the bowels are regular.

Studying the case I found no organic disease of any organ; but ascertained that he passed habitually three pints of urine, of specific gravity of 1022, very acid, free from albumen and sugar, but loaded with lithates, and also containing at times a great deal of mucus. It often shows a considerable deposit of red sand, and when this happens to a marked degree his nervous symptoms previously very bad are strikingly relieved. So they usually are by repeated doses of calomel, which is apt to be followed for a few days by sand in the urine. When he has these abundant sediments of uric acid or the urates, a scalding in the urethra, a feeling as if water were passing from him, though none is passing, a constriction and burning back of the glans, a stinging at the orifice of the urethra; a feeling of pain above the pubes, are annoying symptoms of reflex character; and the uneasy feelings at the head of the penis are greatly aggravated by any irregularity in the time of his meals or in diet. This patient was placed on a diet of fish, green vegetables, a little oatmeal, milk, the white meats; he was directed to drink Apollinaris water freely, to exercise, and to give himself as much relaxation as was compatible with his pursuits. The bowels were kept soluble by Hunyadi-Janos or Friedrichshall water; a little calomel and sodium bicarbonate were occasionally prescribed, and, while the uric acid deposits were so marked, a course of citrate of lithium. He is very much better; but he is not as yet quite well; fresh anxieties and worries bring about relapses.

In concluding this examination of the nervous symptoms I must say something of the mental state. There are spells of languor and lassitude which befall the man whose blood is charged with lithic acid, in which all exertion is painful, and which strangely contrast with his usual energy. Then there is depression of spirits and gloom that may amount to melancholy. But above all is irritability of temper; odours annoy, sounds infuriate, nothing pleases, and it requires more than ordinary self-control

to prevent explosions of temper. The man is on edge, and the acid blood literally makes an acid temper. Indeed, many a man who has the reputation of being a curmudgeon, is simply a lithæmic who finds it impossible to control his engendered irritability.

Of the mental faculties the memory is the one which alone really suffers. It deteriorates markedly, especially after lithæmic vertigo. But in time as the lithæmia is kept away by a careful mode of life, it regains most of its original strength.

The mental state described may last for several years with only temporary periods of relief; or the horizon may at once be cleared by the discharge of large quantities of lithic acid in the lithæmic, as it is by an explosion of gout in the typically gouty. Macaulay's description of the Earl of Chatham's condition is, from a medical point of view, strictly correct. A cloud settled on him; he, a most affectionate father, could not bear to hear the voices of his own children. He bought up houses contiguous to his own, that he might not have neighbours to disturb him with their noise. His appetite was fanciful and capricious; he was melancholy, irritable. The disputes of his colleagues, the responsibility of state, bewildered this boldest of mén, who behaved at times like an hysterical girl, bursting into a flood of tears. He had passed months without a twinge of the gout to which he had been subject since boyhood. At length the gout returned. His nerves were newly braced, his spirits became buoyant; he was once more the proud, resolute statesman. *Nunquam poetor, nisi podager*, says Ennius of himself. The hard-drinking old Roman, fresh from his cups, sang the deeds of his sturdy forefathers only when an attack of gout had purified his blood and cleared his mental vision.

The symptoms of nervous derangement in lithæmia are interchangeable. Sometimes one or several exist for a time; the lithæmic condition gets better, they disappear; the lithæmic condition returns, but with it comes a fresh set of nervous symptoms; and so, until the state is permanently remedied, they may appear for years. Indeed, recurrence of lithæmia is one of its characteristics, and the nervous symptoms may be so persistent that it is difficult to set aside the thought that they are not due to an organic cause.

These nervous outbreaks frequently happen when the manifestations of hepatic and gastric disorder of lithæmia, except in so far as they are recognizable in the urine, are not very marked; indeed, I believe they are more common in this class of cases. Still we find more or less of these phenomena at times present: such as flatulent distension of the stomach and bowels, acid eructations, fulness at the epigastrium, and drowsiness after meals; a bitter taste in the mouth; flabby tongue coated at the back; capricious appetite; constipation, or, what is more significant, stools, from altered biliary secretions, either very dark or very light; short attacks of diarrhœa; passing slight jaundice; small ulcers in the roof of the mouth; hemorrhoids; palpitation of the heart with intermissions in its beat; throb-

bing of the great vessels; lumbago; itching erythematous or slightly scaly eruptions, like pityriasis, on the chest and between the shoulder-blades. Again, we may observe that the patient has great liability, as Murchison so well points out, to ordinary febrile colds, and to more severe local inflammations. Perhaps he has passed gall-stones or urinary calculi; or shows that tendency to degeneration of the tissues, especially of the vessels, which is one of the worst results of the lithæmic dyscrasia. Or his kidneys and his heart may become structurally involved; the heart making its affection manifest by association with the signs of high blood pressure in the arteries, its perverted rhythm, the accentuated second aortic sound, the growing evidence of hypertrophy and mural degeneration, in a manner so brilliantly described by Fothergill. But I repeat, these phenomena have no necessary connection with the nervous manifestations; nay, I think the latter are far more apt to exist when these organic conditions are not developed.

As so much in the recognition of lithæmia depends on the urine, I must say a few words about it. It may be, but it rarely is, copious. It is very generally scanty, deeply coloured, and of high specific gravity. It is very acid, readily deposits urates, of pink or brick-dust colour, and even crystals of uric acid. This state of urine exists more or less at all times, but a very large excretion of uric acid or its salts is apt to bring relief to the other symptoms. The pigment is increased in the urine; and under the microscope we commonly find the amorphous urates preponderating, more rarely well-formed crystals of uric acid, sometimes also oxalates. The urea is not increased, except in some instances, and in these loss of flesh is generally going on. Thus, in one case of the kind examined, the urine which was decidedly acid, had a specific gravity as high as 1035—in itself in the absence of sugar a suspicious circumstance,—was acid, deposited very abundant urates, amorphous under the microscope, had no free uric acid, but contained in 10 c. c. .4 grammes of urea, about double the ordinary amount.

If the other symptoms of lithæmia exist, we must not, from the absence of characteristic sediment, conclude against the increase of uric acid. This excess may be, it is known, present in clear urine, and only be determinable by chemical analysis. Indeed, in any doubtful instance we should resort to quantitative analysis, repeated on specimens obtained at different times. It would be well to make quantitative examinations in any case. But the processes are tedious and difficult in general practice. Pavy's estimation of uric acid by its reducing action upon the ammoniated cupric test (*Lancet*, April, 1880) promises best. Examinations of the blood, such as Garrod has made in persons with articular gout, have not to my knowledge been instituted in those affected merely with lithæmia. They would check off admirably the observations on the urine.

Lithæmia is much more common in men than in women. Its chief sufferers are men in the prime of life. It comes on in some who live

luxuriously, eat largely, drink freely, take little exercise in the open air, and are indolent in their habits. But it is quite as often, or oftener, seen in the active brain workers of good habits; in the marked men in the community in which they live; and it is in them too, that the nervous symptoms of lithæmia are most obvious. My list of lithæmic patients embraces many a name distinguished at the bar, in medicine, in the pulpit, in literature, and in the world of finance. And it is not only brain-work, and all the habits this implies, but strain and worry, which induce it. Our present civilization is very rife with its causes. It is a growing disease in this country, especially in our cities. Malaria also excites it, or at least aggravates it; so do sexual excesses. It happens most often, certainly its nervous manifestations do, in persons of nervous temperament, and it is a diathesis which is readily transmitted. Disordered liver action with imperfect oxygenation of nitrogenous matter is supposed to be its cause, and to lead to the accumulation of uric acid and the urates in the blood. I am far from thinking that this theory covers the whole ground. The symptoms of nervous affection are, I firmly believe, the result of the waste-laden blood; but whether the lithic acid, or the compounds generating it, get into the blood in consequence only of deficient glandular action, as of the liver, is not so clear. Again, the disorder may be first excited by some disturbance of a nerve centre? We now hold as an established fact of science that puncture of the floor of the fourth ventricle causes diabetes. The ingenious reasonings of Dyce Duckworth are paving the way for the belief that in the medulla is a trophic centre for the joints, thus explaining the phenomena of articular gout. Is there also such a centre for causing lithic acid formation and lithæmia? But these are speculations not further here to be indulged in.

I must say one word as to the relations to gout. Gout itself is merely one of the results of lithæmia, and the consequences of a functional derangement of the liver, teaches Murchison; lithæmia is simply undeveloped gout, say others. I believe neither view is strictly correct. There is close relationship, and one predisposes, perhaps readily passes into the other. But we have lithæmia where not a typical symptom of unequivocal gout is to be found, not happening even during the lapse of years, and where there is no inherited gouty diathesis. If we take the characteristic features of gout to be the peculiar periodic recurrence of the joint-affection, we see at once the difference. A little aching in the knuckles or toes at times, in very few enlargement of a finger joint, are the only kindred features of lithæmia; and the diminution of uric acid in the urine for several days before the gouty paroxysm, the scanty excretion during it, the mere traces which, as Senator tells us, are found in chronic cases even between the paroxysms, are not analogous to the abundance of lithic acid or the lithates to be observed in lithæmia. There is a belief that gout is rare in this country; and typical gout certainly is comparatively rare. But lithæmia

is most common, and if it be true gout it is pre-eminently the American gout. As seen with us, it is an affection more often acquired than inherited.

The constitutional state, once established, lasts long, and is difficult to eradicate, although it is capable of being eradicated, or so nearly so, that it ceases to be troublesome. Still, under error in diet or fresh worries, relapse happens, and with it may return the nervous symptoms that are the subject of this paper. As to their treatment, the cases here reported have, I trust, made it apparent. But I may, in conclusion, summarize it: The main principle is, to treat the state, not the nervous symptoms themselves. The indiscriminate use of tonics and nervines which most of these patients are subjected to, is absolutely of harm. Nothing is accomplished until the lithæmia is struck at. In doing this, our most potent means is diet; without attention to it, other remedies are nearly valueless. The diet must be a sparing one, and I think that with those of enfeebled digestion the American plan of a substantial breakfast is best, for in the morning the digestive powers are usually strongest; the other meals must be very light. We diminish the work of the liver and kidneys by lessening the amount of highly nitrogenized food and of the hydrocarbons; hence beef and mutton, butter, cream, fat of meat, sugar in all forms are forbidden, and the less the patient takes of alcohol in any shape the better for him. Champagne is poison to most, a light claret is least objectionable, but water is the best drink for the lithæmic. Fish, oysters, fruits that do not contain much sugar, the green vegetables, except asparagus, are permissible; so are bread, wheaten meal, and oatmeal. Potatoes should be used in moderation, as they are mostly not well digested; eggs should be eaten sparingly. Poultry and the white meats are allowable; and with reference to other meats, although they are, strictly speaking, contraindicated, I find that, plainly cooked, they are well borne; the brain-worker especially requires them, and does better taking them than remaining on an unvarying diet without them. Fats and sugars are certainly far worse, and I have met with more than one case aggravated by taking the sweetish extracts of malt to strengthen the nervous system and the digestion.

Exercise is of importance next to diet, as active as possible without fatigue. Horseback exercise is admirable for persons who will take the time; and I have known the greatest advantage derived from the Swedish movements, especially from those that exercise the muscles of the trunk. Of course, full action of the skin is to be stimulated, and I generally make daily systematic skin friction, either after a shower bath or without it, part of my directions, and when it suits, also order an occasional Turkish bath. To live very constantly in the open air; to take a long mountain tramp or an ocean journey, are most useful prescriptions to persons who can comply with them.

Of medicines, those that stimulate excretory action by the bowels are the most advantageous; mercurials, and the saline purgatives do well for

the purpose in view, but the former at least are too wasteful of strength for frequent use; the nervous tone has to be kept up, not depressed. On the whole, the natural saline mineral waters answer best; and the Hunyadi-Janos, the Friedrichshall water, the Saratoga Congress water are most to be depended on. Nor is it only the purgative waters which are so useful; the drinking of those that tend to neutralize the uric acid by their alkalinity, and to act freely as diuretics, such as Carlsbad, Contrexeville, and Vichy water, or, in this country, the Capon spring water, the Saratoga Vichy, and the Poland water, are excellent; and the free drinking of a table water now much employed, the Apollonaris water, has been, I know, of marked use to many lithæmics. Citrate of lithium often does good, iodide of potassium and colchicum less often. Medicines of direct action on the nervous system I rarely prescribe, until at least the lithæmia is being broken up, or as a very subordinate part of the treatment; among these zinc and arsenic have seemed to me the most serviceable. Bromides may be employed for the nervousness and the sleeplessness, or to influence the headache after the vertiginous seizures. But the less often they, or chloral, are used the better. Remedies of the kind should be reserved for very special occasions. The way to relieve the nervous symptoms of lithæmia, I repeat, is to remove the lithæmia.

ARTICLE II.

ILLUSTRATONS OF HYPÆSTHESIA (ANÆSTHESIA) OF THE THROAT.

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ONE of the least known subjects in the domain of laryngology is that of neuroses of sensation. With the exception of the references in the systematic treatises of Cohen, Mackenzie, etc., not a single case of hypæsthesia of the throat has hitherto been reported or discussed in this country. I define hypæsthesia as diminished sensibility, which is functional and not merely subordinately symptomatic. This definition excludes, on the one hand, ascertained structural throat lesions, which diminish the sensibility by involving directly the peripheral nerves, and, on the other, the conditions in which the particular diminution of sensibility of the throat has none other than a mere symptomatic significance. Instead of "hypæsthesia," the term "anæsthesia" is more generally used; but this should properly be confined to the entire absence or loss of all sensibility, though of course it may be coupled with the adjectives partial or incomplete. The term "analgesia" (with its synonyms analgia and anodynia) is used to denote a loss of the sense of pain, not necessarily accompanied,

with a loss of all other sensation; when the sensation of pain is diminished, not completely lost, I prefer the term "hypalgia."

It is well known that the normal sensibility of the skin varies greatly in different portions of the body surface, and in different persons; this is true to a still greater degree of the throat; moreover, its sensitiveness is very different at different times in the same person; nevertheless, there is some agreement within recognizable limits, and excessive variations must be regarded as abnormal. Nearly half a century ago E. H. Weber[1] experimented on acuteness of sensibility of different portions of the body, and the various æsthesiometers now used are based on his observations. He measured the degree of sensibility by the distance between two legs of a pair of compasses which is required in order that the two points make distinct impressions. In addition to the skin, he examined the mouth, and found that at the tip of the tongue the two points were separately felt when only half a line apart, while on the dorsum and on the edge of the tongue (one inch from the tip) they had to be four lines apart, on the mucous membrane of the hard palate six lines, and over the gums nine lines. On account of the irritation, which touching the throat with any instrument usually produces, it is very difficult to arrive here at any accurate æsthesiometrical results. I have devised a throat æsthesiometer, an account of which will be published in a paper I prepared for the recent International Medical Congress at London.

As shown in the wood-cut, my æsthesiometer essentially consists of two rods, so connected together that their points can be easily approximated and separated, the distance being indicated on a scale near the handle. It is provided with metallic tips *A* in the figure, and soft rubber tips *B*. As the normal distances between the two uncovered points necessary for their distinct appreciation vary from one and a half or two, to three and a half or four centimetres, it is clear that the sensibility of circumscribed spots cannot thus be measured. The examination of sensitiveness to temperature and pressure is more important than merely that of the distance at which the two points are felt separately. The most convenient manner of measuring the differential appreciation of temperature is to give to the two points of

[1] Anotat. Anat. et Physiol., pp. 44–81, quoted by Dr. Johannes Müller, Handbuch der Physiologie des Menchen, Coblenz, 1837, vol. 1. p. 711.

the æsthesiometer, mounted with the metallic tips, different degrees by dipping them into water of different temperatures. For investigating the delicate appreciation of pressure the soft rubber tips are used. Electricity furnishes the best means for measuring the sensitiveness to pain. I discriminate between three different kinds of normal as well as abnormal sensibility of the throat, viz., 1, tactile, by which contact, temperature, and pressure are appreciated; 2, dolorous, by which pain is appreciated; and 3, reflex, from which result muscular contractions, such as cough, spasm, gagging, choking, etc., as well as intra-vascular and secretory phenomena; and each of these kinds of sensibility must be examined æsthesiometrically.

With two or three exceptions, diminution of sensibility of the throat has been observed hitherto in cases only of diphtheria, hysteria, and bulbar paralysis.[1] These exceptions are the case of Ott[2], that of a servant girl, thirty-eight years old, in whom together with cadaveric position of the right vocal band there was anæsthesia of the right half of the larynx, and apparently, some hypæsthesia of the other side. The nasal septum and soft palate were absent and the posterior wall of the pharynx was ulcerated and showed radiating cicatrices. These and other characteristic signs led to the diagnosis of degeneration of the pneumogastric nerve at its origin in the brain, in consequence of syphilis. Whether the syphilis was acquired or hereditary could not be positively determined. Three months after admission the patient died; there was a carefully conducted autopsy and microscopical examination of the brain. Dr. Ott does not fail to call attention to the many interesting features of the case, particularly the non-interference with the action of the heart and with respiration, and the fact that with so much destruction in the nose and pharynx there was no structural lesion in the larynx. The second exception referred to is the case of Jurasz[3] that of a boy six and a half years old who in the course of a croupous pneumonia became affected with difficulty of deglutition and a nasal voice. Examination showed, without organic change in the throat, a relaxed condition of the velum, and no reflex and no sensation on being touched with a probe. Jurasz[4] also reports the case of a young English lady, otherwise healthy, with laryngeal papillomata. She had never before been examined laryngoscopically. Jurasz introduced a probe during the first mirror examination and touched different

[1] See Ziemssen, Handbuch der speciellen Pathologie und Therapie, Leipzig, 1876, vol. iv. p. 434, or the translation: Cyclopædia of the Practice of Medicine, N. Y. ed. vol. vii.; Cohen, Diseases of the Throat and Air Passages, New York, 1879, p. 624; Mackenzie, Diseases of the Throat and Nose, London, 1880, p. 420, etc.

[2] Zur Lehre von der Anästhesie des Larynx. Prager Medicinische Wochenschrift, Jan. 26, 1881, p. 35.

[3] Ueber die Sensibilitäts-Neurosen des Rachens und des Kehlkopfes. Volkmann's Sammlung Klinischer Vorträge, No. 195, p. 23.

[4] Ibid. p. 14.

points in both larynx and pharynx without producing either a disagreeable sensation or any reflex. On the next day he performed galvano-cautery and found the patient "strikingly little sensitive." He thinks that such cases which every laryngologist might report should warn us to be careful in interpreting a hypæsthesia as a sensory neurosis. He suggests as a sure criterion that morbid diminution of sensibility is accompanied by a motor neurosis of these organs or some other affection of the nervous system. In this view I cannot coincide. I think every *excessive* variation of ordinary sensibility must be considered abnormal even if we do not yet know its clinical importance. As to what really constitutes an excessive variation must of course be left to the appreciation of the experienced examiner; no one can form a positive judgment on this case of Jurasz from the meagre data given.

To these cases I desire to add the following:—

CASE I. *Tactile and Reflex Hypæsthesia, with Undiminished Sensibility to Pain.*—M. R., at present 44 years old and showing the characteristic evidences of progressive paresis, first came to me November 9, 1878, more than two and a half years ago. From his history I learned that when a boy, he differed from the other children in the family in character as well as in cranial configurements; he was not studious at school, but preferred to roam about in the country and indulge in daring feats of climbing and other athletic sports. He has kept up pedestrianism and other physical exercises, but had masturbated for some little time. Is married and has several children; now seems, however, to be lacking in natural affection for his family, and is especially averse to sexual intercourse. In business, he has been rather successful, being shrewd and cunning; but on several occasions, he was unsteady, made foolish purchases and thoughtless sales. He had received a shock over twenty years ago, by a partner's embezzlement while he was suffering from some fever, perhaps typhus. He became delirious, and while possessed with the idea of pursuing the defaulter, he wandered about the country for four weeks. Since then he has two or three times had fits of despondency lasting as long and longer, consequent on business disagreements. He has had attacks of uncontrollable anger at his brother, wife, etc., on the slightest provocations, and committed such freaks as hiding in the coal hole, disappearing suddenly in the street, staying during the daytime in bed without assigning any cause (he denied that this was to masturbate, although he freely spoke of his doing so often), not eating for several days, etc.

I examined him very closely and observed him from November 9th to 13th. He talked very slowly and uncertainly, his voice was thick, otherwise normal. He complained that his throat felt *unnatural*. No impairment of either motion or sensation in any other part of his body was complained of, or could be detected; and in the larynx and pharynx, muscular action seemed uninterfered with, except that it was sluggish. He swallowed apparently properly, only very deliberately, but said he could not swallow faster, though he tried, and perhaps it required a little more effort than formerly. There was a good deal of saliva and mucus in his mouth and in the valleculæ. On being touched with the finger and various instruments—not piercing the mucous membrane—sensation in both the pharynx and larynx was found to be markedly diminished; what seemed

very curious to me, and was examined on several different occasions, was that pricking with a sharp point, as well as electricity if at all strong, was felt perfectly well. In fact, he was afraid of being hurt and perhaps exaggerated his sensation of pain, though not so much as to be called oversensitive. On the other hand, the finger and the laryngeal probe induced gagging and coughing with much difficulty, and the patient could voluntarily repress these reflex contractions entirely. He was also able at his will to produce these and all phonatory contractions. Muscular reaction to electricity was not diminished. In the course of subsequent examinations, hyperæmia of the vocal bands and to a slighter extent also of the whole pharyngo-laryngeal mucous membrane appeared, and after applying an astringent disappeared, to come again the next day and to go away without any treatment.

I have seen the patient several times during the intervening two years and a half. His disease has steadily advanced. Paresis is now seen in his face, gait, gestures, etc. He is now under the observation of an excellent physician and a specialist for nervous diseases. In this case it may be that an autopsy, which sooner or later may perhaps be had, will throw light upon the locality of a nuclear centre for the sensory innervation of the throat, as certainly for some time his disease seemed to be confined to this domain. From clinical observation I believe such an independent centre to exist, and Dr. Spitzka, of this city, has suggested to me that it is probably formed by the continuation of the gelatinous gray matter of the posterior spinal horn, which is situated upon the mesial side of the ascending trigeminal root, corresponding (in a transverse section of the medulla oblongata)—in the exit level of the pneumogastric nerve—to the line of demarcation between the restiform column and the lateral field of the medulla. The reasons for adopting such an hypothesis I shall discuss on another occasion.

Analgesia.—Of two cases in which sensitiveness to pain was abolished, though some tactile and reflex sensibility remained, one was certainly of diphtheritic origin; in the second, the following case, the existence of diphtheria was doubtful.

CASE II. On September 21, 1875, Mr. J., of Newburgh, N. Y., brought his son Joseph, æt. 8 years, to me on account of difficulty of swallowing, and nasal speech. The boy had always had large tonsils, hard breathing in the night, some thickness in his speech, and frequent attacks of sore throat. He never has had "regular croup," scarlet fever, or measles. A month or five weeks ago he had throat trouble, very much like what he had had several times before. The family physician called it "follicular pharyngitis," and positively denied its being diphtheria. The father is certain that there were no white patches,—only a few raised spots on his throat, a good deal of swelling, running at the nose, and some fever. The boy was three days in bed. About two weeks ago the voice became nasal, and liquids returned sometimes through the nose. The difficulty of swallowing increased, so that now he cannot swallow liquids and solids at all, and semi-solids with great effort and care only, and then not without cough and spasm. The tonsils were found to be hypertrophied and the throat full of phlegm; but no inflammation present. The velum and uvula were relaxed and somewhat inclined to the right side. During attempts at phonation the palate remained immovable. Rhinoscopical and laryngoscopical examinations showed nothing abnormal. The little patient

allowed me to pierce the velum with a sharp-pointed lance, so that it bled, without complaining of pain. No pain was felt on pricking with the same instrument the back of his throat, the epiglottis, the interior of the larynx, or even the inter-arytenoid fold; but the touch of the instrument was felt, and cough and other reflex reactions were induced, though less violently than normal, in the upper parts, while it seemed to me that on touching the lower portion of his throat that was accessible, for instance, the front wall of the œsophagus, or on passing an instrument below the *rima glottidis*, the reaction was more than usually severe. With energetic use of electricity, tonsillotomy and prolonged astringent local treatment, normal swallowing, speech, and sensibility became restored.

CASE III. *Anæsthesia Dolorosa.*—B. G., merchant, aged 37 years, born in Germany, but since childhood residing in this country, principally in the southern States, consulted me September 15, 1875. He was in the southern army during the rebellion and twice wounded, neither time seriously; but has for many years suffered, off and on, with chills and fevers, and taken quantities of quinia. He comes to New York regularly once a year, usually feels better here than in Tennessee; never before suffered as he does now; thinks he took cold while travelling in a sleeping car. For three days he has had a pain in his throat, which for several hours last night was very violent. To locate the pain he covered over the whole of the larynx. Inspection showed nothing abnormal in either larynx or pharynx, but, to my astonishment, instead of hyperæsthesia I found there anæsthesia; in most places, not confined to either side, the sensibility was entirely lost, in the others it was markedly diminished, the loss of sensibility involving even the skin covering the larynx. The spontaneous pain was neither increased nor diminished by the examination. There was no difficulty in speaking and but little, if any, in swallowing, and nothing wrong with the general health. The pain, at the time of examination, was described as being a boring or dull aching, but was said to have been last night acutely lancinating. I applied locally by means of a sponge a saturated solution of iodoform in sulphuric ether.

This was in the forenoon. At 7½ P. M. I was hastily summoned to the hotel where Mr. G. was staying. I found him in bed and in such agony that I had to give him a hypodermic injection of morphia to quiet him at all. The pain had been much less since the treatment in the morning; but about 6 P. M. an exacerbation had occurred ushered in by a distinct chill. About 9 o'clock the pain subsided with a perspiration. The spleen was enlarged and indurated; and agreeing with the patient that his suffering came from his old enemy—malaria—I let him take twenty grains of sulphate of quinia in solution about midnight, ten grains the next morning, and five grains three times daily for a week. During the next day he had some of the steady aching pain, but no evening accession. Gradually the pain discontinued. Two weeks later, there was no pain, but still some diminution of sensibility both internally and externally. When I saw the patient again, a year later, the sensibility was normal.

CASE IV. *Reflex Hypæsthesia with Normal Tactile and Dolorous Sensibility.*—On July 20, 1873, a lady, probably about 30 years old and married, was sent to me by her singing master because she had lost the power of sustaining notes. She had nothing to complain of as to her health except being tired more or less all the time, which, however, she attributed to the hot weather and worriment of mind. So far as I could ascertain at this one interview she seemed sound mentally and physically. Laryn-

goscopical examination showed nothing wrong structurally; there was neither anæmia nor hyperæmia; on trying her voice I saw that the vocal bands seemed to act perfectly on emitting a note, but their tension lessened and the note flattened a moment after. A little later, the mirror not necessarily being moved out of position, a renewed effort brought out the pure good note again, which, however, became flat in spite of her best intention to hold it. There was an accumulation of saliva in the valleculæ. The touch of the mirror or of the finger in the throat, and of probes in different parts of the larynx, produced no reflex action except quick movements of adduction and abduction of the vocal bands when they themselves or the part in their immediate neighbourhood were touched, but no cough whatever. Contact was felt even if made ever so gently, and the sensibility to pain was normal.

I could not succeed in ascertaining directly any paresis of the thyrocricoid muscles. I advised her going to the country (Catskill Mountains), and gave very decided hygienic directions. She did not return to the city. I learned that she never got any better, and probably committed suicide a year or so later.

CASE V. *Hypæsthesia with Localized Hypersensitiveness to Temperature.*—Mrs D. W., 58 years old, a widow for three years, is the mother of five children, the youngest fifteen years old. Her husband had long suffered with pulmonary trouble, and died from consumption. She, herself, while young suffered from all sorts of sickness. She had the various children's diseases, but grew up to be strong and hearty. She had easy confinements, and always enjoyed good health until three years ago while her husband was ill with his last sickness. She first noticed an accumulation of foamy saliva and phlegm in the mouth and throat, especially on lying down. She first noticed it on trying to lie down to rest in the daytime after being tired out with nursing, etc. This became so bad as to almost prevent sleep and rest night and day. Gradually difficulty of swallowing came on. Swallowing now requires a great effort and is almost always accompanied with a very peculiar noise. She, being a German, calls it a "Schnorren" and a friend of hers describes it as an "abrupt purring clatter." I have heard it often, and unless these three words describe it, it is indescribable. There is also frequently eructation of food, both solid and liquid, immediately after swallowing, but nothing comes out through the nose. She says that she has trouble in getting the temperature of her tea just right, and that she has noticed that food which appears to other people of indifferent temperature strikes her as either too hot or too cold. There is constantly present a large amount of saliva and phlegm, probably from hypersecretion, as it seems too much to be merely an accumulation of the ordinary amount. I found the sensibility of the pharynx and larynx to be much diminished every way, except that sometimes the metal tip of the æsthesiometer was felt as being extremely cold. Careful examination showed that the sensibility to temperature is very much exalted at the entrance of the œsophagus and in the upper portion of the larynx posteriorly. This hypersensitiveness is quite localized. The epiglottis is hypæsthetic, nevertheless if there ever was a woman free from what is called "hysteria," it certainly is Mrs. W. In spite of the difficulty of swallowing—and that is the only trouble she knows of—her general health is excellent. I have prescribed nux vomica, applied the ethereal solution of iodoform to the œsophageal and laryngeal portions sensitive to temperature, and used electricity both indirect and direct to other portions of the throat. She is improved, but still under treatment.

ARTICLE III.

THE SYMPTOMATOLOGY OF PRIMARY, IMMEDIATE, OR DIRECT HEMORRHAGE INTO THE VENTRICLES OF THE BRAIN.

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IN the July number of this Journal for the current year, I studied in detail the varying modifying conditions of a primary irruption of blood into the ventricles of the brain, the article dealing more especially with the etiology, pathology, morbid anatomy, prognosis, and diagnosis of the disease, the main object being to establish the existence of such a morbid condition. Considering that the occurrence of such a form of hemorrhagic effusion into these important cavities has been demonstrated, I now proceed to complete the study of the subject by discussing the symptoms which characterize its clinical manifestations. These naturally divide themselves and are best studied under the two general heads of the premonitory symptoms, and the symptoms of the attack.

Premonitory Symptoms.—We may in the same way speak of the premonitory symptoms of this disease that we do of similar manifestations in ordinary cerebral hemorrhage. Such symptoms are not, however, as Nothnagel points out, truly premonitory of impending hemorrhage in the same sense in which we speak of the prodromal stage of the acute exanthemata, but rather indicate active intracranial disease, especially vascular disturbances, which may or may not be followed by hemorrhage. Bearing in mind this restricted use of the term, primary intra-ventricular effusion of blood may, like extravasation into the brain substance, be said to be preceded by premonitory symptoms. They are in no way characteristic of the disease, in fact they are entirely analogous to those of ordinary cerebral hemorrhage, and cannot be distinguished from them. They may exist for a considerable period preceding the actual attack, or may first appear a few hours only before its onset; they may be so slight as hardly to attract the attention of the patient, or may be so marked and violent as to strike the most careless observer; they may be few or many; but the severity and rapidity of the attack bear no positive relation to the previous existence or non-existence of such premonitory symptoms, nor to the intensity or feebleness of such as may have preceded the seizure.

Of the 94 cases of primary ventricular hemorrhage collected by me, in 32 cases the clinical history was either entirely wanting or so imperfect as to render them entirely useless for the determination of the symptomatology. Of the 62 remaining cases, in 24 premonitory manifestations are noted as being present. Cephalalgia is the most common and constant, and therefore the most important of the premonitory symptoms. Its existence is noted in 15 cases. It may be present for many months or even years,

or may first appear a few hours or perhaps immediately before the onset, it may be continuous or intermittent, it may be slight or aggravated, it may be localized or diffused, it may be dull or shooting in character, its seat may be fixed or varying; in fact its general characters in no two cases can be said to be similar. Thus in one case it is referred to as an obstinate, persistent pain; in another as an acute momentary pain darting through the head a short time before the attack; in still another it existed as a mere sense of fulness in the head for some time previous; in a fourth there were occasional pains and heaviness in the head; of a fifth case it is stated that the patient had complained almost every day for several months of a not very severe headache; another had frequently suffered from a similar condition; and in a seventh, that of leucocythæmia, the patient began to complain of pain in his head about twelve days before the fatal attack. One patient suffered from continual cephalalgia for two years, so the history states; another was subject to headache; another had merely a slight pain on the day of the attack; another, a violent cephalalgia just before the seizure; while in an instance of cerebral aneurism, the patient complained of violent headache; and in another case of the same kind, eight weeks before its rupture the patient suffered from headache especially on rising from the horizontal posture, gradually increasing during the course of a week, the pain being seated in the vertex becoming very severe, but finally disappearing. From the foregoing it may be deduced, that cephalalgia is only important in so far as it points out the possibility of occurrence of some form of cranial disease; but for the differentiation of such disorder it is absolutely useless.

Dizziness or giddiness is mentioned in 8 cases, being about second in frequency to cephalalgia. In several it preceded the attack for some time, in others occurred several days before or immediately before it. In one patient shivering or chilliness is noted, in this case ushering in the seizure only by a few hours. Among the other premonitory symptoms noticed some time before the actual onset, we find drowsiness, heaviness of head, slight deafness, malaise, peculiar indescribable sensations about the head, and sensitiveness of one cheek, each in one case. In two patients sickness of the stomach was present some time before the seizure. In three instances a muscular weakness is reported as having pre-existed, and then only as an occasional or persistent sense of numbness or feebleness in the lower extremities in two, and in the right extremities in the other cases, in one patient preceding the attack only by a few hours. In one case cramps preceded the onset for some time, and in another patient symptoms of passive congestion of the brain are described as being present, this same individual often finding himself unable to remember the word he wished to use; while in two others it is merely noted that premonitory signs had been observed.

These premonitory symptoms may be grouped together or may occur

singly, the rule apparently being, judging by my cases, the latter. From a diagnostic or prognostic point of view they are of but slight practical importance.

Symptoms of the Attack.—Here again I must draw attention to the close resemblance in the mode of onset between ordinary cerebral hemorrhage and the form with which I am dealing. Like it, it varies in the different cases, beginning in one by convulsion, in another by coma, in yet another by paralysis. The different modes of onset may be best classed and discussed under the following heads:—

1. By rapid death; 2. By convulsions; 3. By paralysis without loss of conciousness; 4. By paralysis with partial or complete loss of consciousness; 5. By partial or complete loss of consciousness without paralysis. The mode of onset is more or less distinctly mentioned in 45 cases.

1. *By rapid death.*—This has already been discussed in my previous article when speaking of prognosis (*Amer. Journ. of the Med. Sci.*, July, 1881, p. 127).

2. *By convulsion.*—This was the ushering-in symptom certainly in four cases, and possibly in two others, of which it must be admitted the histories were very imperfect. In the four former death was rapid, in one "almost immediately," in the second, "three hours after the convulsive seizure," in another, "seven hours after the invasion of the convulsions," and in the fourth about twelve hours after the beginning. In the two latter the mode of onset cannot be positively established, but in both convulsion seems to have been the initiatory symptom, and in these cases death followed respectively in twelve hours and one week. In all these cases blood was found in both lateral ventricles, in two being present in all the ventricles, in two in the two lateral and the third, in one of which there was found some spinal meningeal hemorrhage; in one in the two lateral and the fourth, and in one in the two lateral ventricles alone. In all the hemorrhage was abundant.

3. *By paralysis without loss of consciousness.*—This was the opening symptom in 5 cases, in 3 appearing as a left-sided hemiplegia, in 1 as a paralysis of all the extremities, and in one the seat of the paralysis is not stated. In two of the three cases of left hemiplegia there was defect of speech, probably, however, due to the lingual paralysis which coexisted in both patients. In neither did it amount to a true aphasia. Although such an onset can hardly be said to be overwhelming, but must rather be considered comparatively light, still in a prognostic point of view it is of bad import, since death rapidly followed in all the cases, a fatal issue occurring in 2 hours in 2 cases, in 12 and 19 hours in 2 other cases, and only in 1 case was it delayed to the third day. It does not seem to bear any relation to the quantity or seat of the extravasated blood, since in two instances it was found in all the ventricles, in one in the right lateral and

third, in another in the third and fourth, and in still another in the lateral only. However, the lateral ventricles were generally involved.

4. *Paralysis with partial or complete loss of consciousness* seems to have been one of the most frequent modes of onset of primary ventricular hemorrhage, having been observed in no less than 15 cases. In 5 the unconsciousness was complete from the very beginning; in 3 partial, varying from mere stupor to semicoma; and in 7 cases the degree of loss of consciousness could not be ascertained from the history. In 9 cases the paralysis was hemiplegic, five times being left-sided, four times right. The seat of the hemorrhage and the amount of blood poured out seem to bear no positive relation to this mode of onset, although in every case either one or both lateral ventricles were filled with blood, in 5 cases the blood being found in the left lateral ventricle only, in 1 in the right lateral alone, in 3 in both lateral, and 3 in all, in 1 in the lateral and third, in 1 in the left lateral and third, and in another case in the right lateral, third and fourth ventricles. In only 1 case was utter powerlessness or complete paralysis noticed at the onset. The period of time intervening between the onset of the attack and death varied in these cases from less than one hour to eight days, most of the patients dying only after several days had elapsed. This mode of onset may, therefore, be said to be comparatively mild.

5. *By partial or complete loss of consciousness without paralysis.*— This is the most frequent mode of onset met with in primary intraventricular hemorrhage, occurring in 20 of my collected cases. The degree of loss of consciousness varied greatly in the different patients, but in the majority, 14 cases, was complete from the very beginning. In the 6, in which the unconsciousness was partial from the commencement of the attack, in all but 1, one or the other of the lateral ventricles was found distended with blood, and in all but 1 the hemorrhage was moderate in quantity. In the 14 cases, in which the coma was complete from the very beginning, the same relation as regards the seat of the hemorrhage seems to have held good, but in the majority the extravasation was far more abundant. Whether or no the degree of loss of consciousness is related to the suddenness of the effusion I am unable to decide, though the necessary deduction from the cases examined would seem to be in favour of such a supposition. Death is usually delayed in the cases opening with loss of consciousness, several days usually elapsing before the fatal issue occurs; in eight cases two or more days intervening between the onset and death. In two of these cases the onset appears to have been by loss of consciousness conjoined with rigidity of the extremities.

It will be observed that I have been, in great part, unable to determine a definite relationship between the mode of onset and the seat and amount of the effusion, but a more positive connection has been established between the onset and ensuing rapidity of a fatal issue.

Before entering on a detailed description of the symptoms of the disease it is necessary to state that, as in the diagnosis of most other diseases, there is no single symptom which can be considered characteristic of it. As the late Professor Budd was in the habit of saying, speaking of the diagnosis of pregnancy, "it is rather by an accumulation of evidence than by any single symptom that we are able to decide." (*Verbatim Report of Lectures on Obstetrics.*) Hence, although each symptom or set of symptoms is taken up in turn, we must fix our minds upon the fact that, by the peculiar grouping of these symptoms, is the totality of the clinical history of the disease made up.

I. *Deranged Intellection.*—Disturbances of intellection are, in the vast majority of cases, present at some time, varying in degree from a mere confusion of mind or a simple drowsiness, to stupor and coma more or less profound. They may appear at the very onset or may be delayed.

Confusion of mind, as an early symptom, appeared in two cases, in one the patient was found supporting himself by a bed-post, very much confused, but still conscious; in the other his mind is described as for a time seeming very obtuse, though intelligence was apparently unaffected.

Delirium, usually of a quiet, muttering form, sometimes appears in those cases where life is prolonged for several days, in such being probably indicative of cerebral irritation, perhaps inflammation of some part of the brain, due to the presence of a foreign body, the extravasated blood, in fact in two cases secondary inflammation of the ventricular lining membrane actually did occur, as shown by the *post-mortem* appearances. The delirium may appear quite early, but in most cases shows itself only after several days, coincidently with febrile symptoms.

Drowsiness.—Simple drowsiness I presume to be a rare symptom, since I find it recorded as present in two cases only. In one it took the place of light coma, only again to be followed in its turn by complete unconsciousness, while in the other it soon gave place to coma.

Stupor exists more frequently than simple drowsiness, though the same remark holds true of it that does of the latter, it is usually soon followed by coma. However, in several instances, the loss of consciousness seems at no time to have reached a degree which could be considered as a true coma, but rather remained a pure and simple stupor throughout; as in a case by Mayo, and in my own patient.

Collapse.—In several patients collapse occurred at the very beginning of the attack, while in one other case it soon followed the initial symptoms. In none did reaction take place, and in all death rapidly supervened.

Unconsciousness.—"Where hemorrhage takes place into the ventricles of the brain," says Le Gros Clark, "it is usually in sufficient quantity to produce coma, but this is not invariable." This statement, though apparently a mere surmise, as indicated by his after-remarks, is borne out by facts; for in 54 out of 88 cases, in which more or less direct reference is

made to this point, loss of consciousness, either partial or complete, was observed; in some instances being partial at the commencement, and so remaining throughout, or gradually becoming more and more profound until complete abolition of intelligence was reached; in others sudden coma, complete in degree, came on early, continuing so to the end, or, as occurred in quite a number of cases, improvement followed, intelligence being partially or even absolutely restored, and so persisting for a longer or shorter period of time, only to again give place to coma. In no case, as far as I am able to determine, was consciousness retained throughout. Coma, therefore, whether light or profound, is to be considered as a constant symptom of primary intraventricular hemorrhage. On comparing the prevalence of this symptom with the same in the secondary form, we find the following statements by authors. "I said that if it (the blood) burst through into the ventricles, then he would fall into a state of coma." (Wilks, *The Med. Times and Gaz.*, vol. i., 1868, p. 439.) Bastian (*Clin. Lects. on the Common Forms of Paralysis from Brain Disease, The Lancet*, vol. i., 1874, p. 720) says: "More frequently, however, we find this condition of coma produced by an extensive effusion of blood, which breaks its way from the brain-substance into the lateral ventricles, etc." According to Aitken (*Pract. of Med.*, vol. ii., Philad. 1866, p. 260): "Coma is very profoundly marked at the commencement, and remains of equal intensity, or the patient, after partially recovering from a slight seizure, is again suddenly plunged into profound coma, from which there is no recovery. This second attack is presumed to indicate the rupture of the hemorrhage, either into the ventricles or the arachnoid cavity, from its original site of extravasation in the medullary substance of the brain near the ventricles, or near the surface." We thus see the close resemblance, as regards this symptom, existing between the primary and secondary forms of ventricular hemorrhage, and therefore, as a differential sign its mere existence is of but little practical value in differentiating these two conditions. It may vary greatly in degree; in some cases, however, the coma may be so extreme that external irritations, no matter how powerful, may be unnoticed.

Lidell (*Treatise on Apoplexy, Cerebral Hemorrhage, etc. etc.*, N. Y., 1873) seems to think that the amount of blood extravasated determines the degree of unconsciousness. This supposition my cases distinctly disprove; for in many, where the hemorrhage was comparatively slight, as, for instance, only partly filling one lateral ventricle, coma was present to a marked extent. Such were cases reported by Normand, Cleveland, Langmore, Tacheron, etc.

Though it is hardly in accordance with the plan I have laid down for myself in this article to enter into anything like an extended discussion of the theories which have been advanced to explain the occurrence of the various phenomena of the disease, yet in this and certain other instances I shall depart from this rule. It must be remembered that though dealing

with a lesion which primarily generally involves one side of the brain, as a rule, we have one which tends in the majority of instances to ultimately directly affect both sides, blood confined to one ventricle being the rather rare exception than the rule. "The accumulation of blood in these cavities," Gendrin remarks (*Traité Philosophique de Méd. Prat.*, tome iii., Paris, 1838, p. 502), "may determine temporarily symptoms in relation to its seat in a single lateral ventricle, the compression consequently acting upon a single hemisphere; but the symptoms may soon be confounded in the general phenomena of an apoplexy, characterized by general suspension of the encephalic functions, resulting from a compression operating necessarily on the entire brain." Here we have a simple compression of the brain advanced to account for the loss of consciousness, but such a condition acting alone has long since been discarded as inadequate. In ventricular extravasation we have a more profound and universal lesion than in simple interstitial encephalic hemorrhage, and consequently would seem to be in a position to more easily comprehend why there should be partial or total abolition of consciousness. Simple pressure rapidly produced with consequent rapid induction of cerebral anæmia, as supposed by Niemeyer, would appear to receive a certain amount of support from such an extensive lesion as usually prevails in primary ventricular hemorrhage. Many arguments have been brought to bear against this theory, which need not be repeated here. In my own cases such a supposition is not borne out by the autopsical appearances, for in quite a large number of cases either meningeal or cerebral congestion, or both, were found. Nor do I think the so-called "étonnement cerebrale" of Trousseau, or the "cerebral shock" of Hughlings Jackson, furnishes a more applicable explanation. The disturbance of the equilibrium or proper relations of the various parts of the brain, each to each, requisite for the normal functioning, the destruction of one part, the squeezing of another, or the anæmia of one and the congestion of another, conditions which have been advanced by Jaccoud (*Path. Interne*, vol. i. p. 164), to explain the occurrence of coma, and elaborated by Hughlings Jackson, who, terming it "brain shock," believes (*A System of Medicine*, by J. Russell Reynolds, vol. ii., 2d ed., 1872, p. 546) that "the torn brain receives a shock on the side injured directly, and this is transmitted and reflected on the other side, and then there is produced the 'névrolysie,' which is apoplexy." Such a theory, it must be obvious, is incapable of general application, being only useful in the explanation of particular cases. Besides, as the result of hundreds of experiments on animals, Nothnagel pronounces against it.

I would offer the following theory, in as few terms as consistency will permit, which, though not of universal application, will, I think, apply in our case. It is known that a sudden blow or injury inflicted upon the circumflex nerves not infrequently arrests function, usually temporarily, inducing paralysis of the deltoid. A similar loss of function in the cells of

the solar plexus follows blows upon the epigastrium in a few cases, in fact death has been caused thereby, as in an instance by Sir A. Cooper, quoted in his lectures. In the experiment known among the Germans as the "Klopfversuch," the tapping experiment, by which blows delivered upon the belly of the frog over the solar plexus are made to induce vaso-motor paralysis, the cause lying in a deprivation of the controlling function of this plexus (Goltz); the blow renders the ganglionic cells inactive. It is also known that in concussion of the brain, where no positive anatomical lesion has as yet been found, consciousness is lost. Here the impulse of the blow received is transmitted through the bones of the skull to the brain, and loss of function results (Bruns, Fischer). A not uncommon instance of permanent death of a cell due to an injury is found in those instances, where, in the bones of the skull, without visible injury superficial necrosis takes place following blows by glancing or spent projectiles. Here the life is literally "knocked out" of the bone cells. Similarly, the soft parts suffer like effects. The blow or injury inflicted upon the cells of the cortex of the brain, governing intellection or consciousness, by a sudden lesion within its substance, causes an abeyance or abolition of their function which is loss of consciousness. In hemorrhage into the cranial cavity we have an injury or blow to deal with, the suddenness and extent of which determines the rapidity and degree of the subsequent coma. Such an explanation would apply as well to those cases where the loss is permanent as to those where consciousness is regained and again lost, the second attack of coma depending upon a recurring extravasation causing a new traumatism, the ganglionic cells being at first only temporarily deprived of their function by the blow inflicted upon them. Where the hemorrhage is into the ventricles we have the force of the blow transmitted to the cortex, which, covered in by the almost unyielding bony box, receives the brunt of the injury, and hence is most profoundly affected, its cells suffering accordingly. This theory, therefore, expressed in the fewest possible words, is, the nerve cells receive a blow which temporarily or permanently deprives them of their power of functioning.

II. *Motor Disturbances. Contracture.*—Since the time of Durand-Fardel early contracture, which is the form here referred to, has been considered characteristic, even almost pathognomonic, of the escape of blood into the ventricles or upon the surface of the brain. However, we now know this to be far from the truth, since it has been found present in cases of cerebral hemorrhage confined to the brain substance, in cerebral abscess, meningitis, and other pathological conditions. Among 8 cases of escape of blood from the substance of the brain externally upon the surface, there was 6 times contracture of the paralyzed side and once of the non-paralyzed members; while in 26 instances of primary meningeal hemorrhage contracture occurred in only 5, and always on the paralyzed side. Boudet among 41 cases of primary meningeal extravasation found this symptom

present 13 times. Thus among a total of 75 cases of meningeal hemorrhage, both primary and secondary contracture existed 25 times, that is 1 in every 3 cases. Among 18 cases of secondary ventricular hemorrhage Durand-Fardel observed this symptom either in the paralyzed or non-paralyzed extremities 15 times. Of the 94 cases of primary ventricular hemorrhage that I have collected, in only 48 was the history such that the presence or absence of this phenomenon could be established. In these 48 cases it was present 18 times, and of these in only 6 instances was the lesion found, *post mortem*, to be a simple uncomplicated extravasation. In 2 of these 6 cases the rigidity involved only the muscles of the lower jaw, causing trismus; in 1 an arm paralyzed by a previous attack of cerebral hemorrhage was affected; in 1 case there was contracture of both arms, trismus, with resolution of the lower extremities; and in 2 others the symptom was general, involving all the extremities. In the 12 other cases the complications were in 2, blood over the meninges; in 1, laceration and softening of the septum; in 2, laceration of the ventricular parietes; in 2, blood over the meninges and rupture of the septum lucidum; in 1, laceration of the fornix and walls of the ventricles; in 1, blood over the meninges and laceration of the fornix, septum, commissures of the third ventricle and slight tearing of the corpus striatum; in 1, blood over the meninges and laceration of the walls of the fourth ventricle; and in 1, tearing of the ventricular parietes (third and both lateral), as also of the fornix and part of the corpus callosum; and in 1 other, blood over the meninges with some laceration of the left lateral ventricle. Thus in 10 of these cases laceration more or less extensive existed at some point in the ventricular walls. In 2 of these 12 cases the contracture was confined to the muscles of the lower jaw, trismus, in 2 to the extremities of one side of the body, in 1 to the muscles of both arms, and in 7 it may be said to have been general, all of the extremities being affected. Thus we have in the 18 cases:—

	Times.
Trismus alone	4
Contracture of one upper extremity	1
" " both upper extremities	1
Trismus and contracture of both upper extremities .	1
Contracture of the extremities of one side . . .	2
" " all the extremities	9
	18

In the four instances in which trismus alone was observed the anatomical lesions were so arranged that in every case irritation was brought to bear on one or both corpora striata directly. Thus in one case blood was found in all the ventricles, in two in both lateral and the third, and in the fourth patient in one lateral, the other lateral being filled by highly coloured serum, while the condition of the third ventricle was not stated. In two of these cases there was quite a large quantity of blood found at

the base, and in one the septum was also torn. Ferrier has shown that in rabbits, grinding of the teeth, but no true trismus, follows irritation of the corpus striatum, while the jaws become firmly clenched on stimulation of the anterior tubercles of the corpora quadrigemina. Whether or no the trismus in these cases is to be accounted for by a direct irritation, continuous in its action, of the corpora striata or tubercula quadrigemina is manifestly difficult to decide, but I am inclined to blame stimulation of the latter bodies. However, it is no more than fair to state that in many of the cases where blood was found in both the lateral and third ventricles all signs of contracture were absent. Why it should be present in some cases and absent in others cannot be determined, unless we suppose something more than the mere effusion of blood into the ventricles. In two of the cases of trismus convulsions coexisted at some time during the attack, both being instances of the form in which quite a large quantity of blood was found at the base.

In the patient in whom the contracture was confined to one arm, the left, this member had been paralyzed by a previous attack of cerebral hemorrhage. The arm is described as being "stiff and incapable of flexion," and it is also added that the day before the appearance of the symptom, the case having run over several days, the paralyzed side had been the seat of convulsive movements. The anatomical lesion consisted in an extravasation of about sixty grammes of blood into the left lateral ventricle. Here then we have lesion and symptom on one and the same side. Since crossed action is the rule, we must look for an explanation to the theory which considers contracture a reflex phenomenon. Perhaps this may be found in Bastian's statement that hemorrhage into one lateral ventricle may cause rigidity by irritation of the corpus striatum of the opposite side. In this case convulsion, as already mentioned, coexisted, without, however, any complicating condition.

Two patients were the subjects of contracture involving the extremities of one side of the body; in one no paralysis anywhere could be made out, while in the other this condition affected the left side, the right or non-paralyzed side being the seat of the rigidity. In both all the ventricles were found filled with blood, and in both there was some laceration of the ventricular parietes. In one, that in which the rigidity was present in the right or non-paralyzed extremities, a slight laceration existed over the posterior walls of the left lateral ventricle; while in the other, where the contracture was observed on the left side, the laceration was found around the right middle cornu. Thus in both cases the rigidity was on the side opposite to the seat of the laceration. Can it be that irritation radiating from these lacerated regions, possibly to the restiform body of the same side, produced the symptom? Duret found that the slightest irritation of one of these bodies was followed by *general* tetanic spasm; hence such an explanation is hardly to be entertained. Direct

irritation of one of the corpora striata might possibly be urged, but here it is to be remembered that in both cases all the ventricles were found filled with blood. In one of these two cases convulsions were present, but no blood had escaped externally.

Both upper extremities alone were the seat of contracture in only a single case, but in another patient this condition coexisted with trismus. These cases resembled each other in that in both blood was found in the lateral and third ventricles, but differed in that in one the blood was confined to the limits mentioned, whereas in the other it was also present over the entire convexity, the septum being also torn. In the former case there was coexistent resolution of the lower extremities, but in the latter no paralysis was noted. In the one direct irritation of the cortical motor centres for the arms might be supposed, but as in both an exactly similar ventricular effusion was found it would seem more probable to suppose a direct irritation of the nucleus caudatus of each side, or perhaps of the anterior tubercles of the corpora quadrigemina.

General rigidity or true tetanoid spasm of all the extremities existed in the largest number of cases, nine. Here the amount and seat of the extravasation varied greatly; in two cases being to a small quantity in both lateral ventricles only, in one of which the ventricular parietes were torn; in four in all the ventricles, one of these being complicated by laceration of the corpus striatum, septum, fornix, commissures of the third ventricle and the ventricular walls, as also by a small clot close to the upper part of the left restiform body, another by tearing of the walls of the third and both lateral ventricles and of the fornix and corpus callosum, while a third was accompanied by extravasation under the arachnoid over the medulla; in one patient the blood was found in the third and fourth ventricles, the fornix and ventricular walls being torn; in still another the blood existed in the third and fourth ventricles, some meningeal extravasation and laceration of the walls of the fourth ventricle coexisting; while in one other instance the hemorrhage was confined to the left lateral ventricle, but in connection with it great distension of the same cavity by serum was also found, the other lateral ventricle containing serum, though to a less degree. The lesions in most of these cases, it will be observed, were extensive, but differed markedly in the different cases, though in all but two both corpora striata were pressed upon directly; in six the lesion being such that irritation of the corpora quadrigemina can be demonstrated, while in two certainly the same could be shown of a restiform body, centres whose stimulation has been found to give rise to rigidity of the various parts of the body. In six of these nine cases laceration of the ventricular parietes was found; while in three true epileptiform convulsions coexisted at some time with the contractures, in none of which, however, had the blood escaped over the meninges.

It must be concluded, from the foregoing, that, as a rule, no direct rela-

tion can be traced between the seat, amount, and extent of the ventricular extravasation and the presence or absence of contracture. Why, then, should it occur in certain cases, and not in others? The answer to this question, I believe, will be found in the fact that more than a simple irritation from pressure within the ventricles is necessary for its production. Durand-Fardel believed that in secondary cases of ventricular hemorrhage, contracture was due to the laceration and gradual disintegration of the cerebral substance by pressure of the effused blood. Roberts seems to hold a similar opinion, for he affirms (*Pract. of Med.*, Phila., 1876, p. 836), that "if there is extensive laceration of the brain, rigidity and muscular twitchings are prominent." Todd entertained a like belief. We have seen with what frequency the symptom coexisted with secondary extravasation of blood into the ventricles dependent upon laceration occurring in 83.3 per cent. of such cases. Of my 94 cases, 36 were complicated, and of these 12 were marked by contracture more or less extensive; in 13 cases the symptom was entirely absent, while in 11 instances the clinical history was so imperfect as to be useless. The complicating condition in the 12 cases accompanied by contracture consisted in 10 of laceration of the ventricular walls; in 5 of these blood over the meninges coexisted, not confined to any particular region. In the two remaining cases, the complicating condition was blood over the meninges, being in both instances confined to the base. Of the 13 complicated cases unaccompanied by contracture, in 7 instances the complication consisted in escape of blood over the meninges, in 3 in rupture of the septum, while in the remaining cases there was slight laceration either of the corpus striatum or optic thalamus.

Of the 58 simple cases remaining, 21 may at once be put aside as useless on account of the absence of a clinical history, leaving 37 cases, in only 6 of which was rigidity observed. In this frequency of the coexistence of laceration with the occurrence of contracture, I believe there is more than a mere accident, although it cannot be positively shown that laceration always coexists with this symptom, since in a small percentage, it cannot be demonstrated, yet when we remember the likelihood of this morbid condition being overlooked, it would seem that its presence is almost a necessity, the more so when we consider the almost uniform occurrence of the symptom with the secondary form of ventricular extravasation consecutive to laceration of brain tissue.

Early contracture varies greatly as regards the time of its appearance. It may be immediate, occurring coincidently with or very soon after the beginning of the seizure, the immediate form; it may first be observed at a period varying from some minutes to several hours after the onset, but during the actual course of the disease, the intermediate form; or it may first show itself only a short time before death, the delayed form. Durand-Fardel in his secondary cases found that it was rarely present from the

beginning, most frequently appearing during the course of the disease. Among the 18 cases in which I find this symptom noted, it far more frequently appeared during the course of the attack than at its beginning or towards its close; thus in 3 patients it was of the immediate variety, in 14 of the intermediate, and in but 1 was it delayed, presenting itself in this instance but a few minutes before death.

With regard to its persistence, here also great differences are observed. It may be (1), merely transitory; (2), intermitting, partaking of the character of a true tetanus, general tetanic spasms appearing at more or less definite intervals; or (3), persistent, continuing uninterruptedly from the time of its inception up to or within a short time of death; and (4), interrupted, that is, the contracture may alternate with, precede, or follow epileptiform convulsions. In his cases Durand-Fardel often found the symptom a mere transitory one, observed only on repeated and careful examinations. This, he thinks, explains why it so often escapes observation; and in this we may possibly find an explanation for its being overlooked in the form of disease I am dealing with. According to Straus (*Schmidt's Jahrb. des Gesammt. Med.*, bd. clxxvi., 1877, s. 16, from *Thèse de Paris*, 1875), rigidity is often accompanied by convulsion of an epileptiform character, usually beginning in the paralyzed limbs. (Charcot.) Tonic spasms of one, two, or more limbs, following Bastian, may alternate with contracture, or there may be rigidity of the limbs of one side, with clonic spasms in one or both extremities of the opposite side. Resolution sometimes precedes, or at times follows the contracture, or the two conditions may coexist in different members. In my 18 cases in none was the symptom reported as transitory, thus strengthening the suspicion that it was sometimes overlooked; in only 2 was it intermittent; in 10 persistent, and in 6 it was preceded by, alternated with, or followed by convulsions.

As has already been shown, contracture varies greatly in its seat and extent (see table, p. 345). It may simply involve a single muscle or group of muscles, or it may be so general as to be fairly considered almost universal. In the secondary form of ventricular hemorrhage, its usual seat is on the paralyzed side of the body, seldom on the non-paralyzed. Thus in 18 such cases Durand-Fardel found this symptom in 13 affecting the paralyzed, in only two the non-paralyzed members, while in the three remaining patients, there was simply resolution of the extremities. Hirtz expresses the opinion that if paralysis and contracture appear coincidently, the latter always affects the paralyzed limbs. I am unable to positively determine the bearings of this question upon cases of primary ventricular hemorrhage, since in quite a number of instances the clinical history is so very vague and imperfect, that the presence or absence of paralysis cannot be established, though as far as they go, they seem to show that Hirtz's rule is not of so universal application as he believed, while holding good, however, in the majority of cases.

Different degrees of contracture will be manifested in different cases, in some existing as a mere stiffness, hardly perceptible except on careful manipulation; or it may be so marked and extreme that the most powerful effort can scarcely overcome it, flexion or extension of the contractured member being next to impossible. Todd states that it may vary from an increased plumpness of the biceps of the arm and hamstring muscles and a resistance of these muscles to extension of the forearm and leg up to a contraction almost tetanic. He is here speaking of the symptom in its general relations. It is usually confined to one side of the body (Durand-Fardel), sometimes involves a single extremity and then almost always an arm, either the entire member, the forearm, or even the fingers alone; it is sometimes bilateral and partial, always involving symmetrical extremities; in such cases, as far as I am aware, always affecting the arms. It may involve only a single muscle or group of muscles; while rarely attacking the muscles of the face proper, it quite frequently seizes upon the elevators of the lower jaw, giving rise to well-marked trismus. As we have seen, the rule seems to be in the form of disease with which I am dealing for it to involve a large number of muscles, not infrequently all the limbs being the seat of the symptom. The rule is, that the flexors are more profoundly affected than the extensors, in this respect corresponding with the results of Ferrier's experiments, such being especially true of the upper extremities. In the lower extremities rigid extension is far from infrequent, as for instance in the case of primary ventricular hemorrhage coming under my observation.

Contracture, although an important sign of primary intraventricular extravasation, is far from characteristic or pathognomonic of it. Its presence should merely excite a suspicion of the existence of this peculiar form of intra-cranial hemorrhage, but in no instance ought a positive diagnosis to be based upon this symptom alone.

Convulsion.—It is claimed by Durand-Fardel that convulsions are much less frequent in rupture into the ventricles than contracture. Among his numerous cases of secondary ventricular hemorrhage he found this symptom present only six times. Hughlings-Jackson, on the contrary, believes that where blood breaks into the lateral ventricles (*loc. cit.*, p. 536), there is usually, not always, a convulsion. He further adds: "If a patient be first hemiplegic with or without unconsciousness, the subsequent occurrence of a severe convulsion followed by universal powerlessness and deep coma, is strong evidence of rupture into the ventricle." Nothnagel (*Cyclop.* by Ziemssen, vol. xii. p. 101, N. Y., 1877), considers convulsions to be especially frequent when the hemorrhage has broken through the floor of the fourth ventricle. Hirtz in his 77 cases of escape of blood into the ventricular cavity found convulsions in no less than 53 cases.

Convulsions I believe to be one of the most important and frequent symptoms of immediate ventricular extravasation. Of my 94 cases but

49 are useful in arriving at the relations of this symptom, and in 21 of these convulsions, more or less general, were present. In most cases the convulsions appeared early, not infrequently opening the attack; sometimes, however, first showing themselves during the course of the seizure, and in a few instances appearing late; death in such cases occurring during a convulsion. Thus in these 21 cases, they were early 15 times, occurred during the attack twice, and twice just before or during the death agony. They vary in degree and extent, from mere twitchings, tremblings, or tremors of a localized part or one or several extremities, up to a universal violent, epileptiform seizure. They may occur either at long intervals, or may appear every few minutes, or may even be almost continuous. In two cases the convulsive movements were confined to the paralyzed side, in one they affected the arm only, in another the face, leg, and arm; in a fifth they involved previously paralyzed lower extremities, while in one other case they were partial at first, but later became general. When the convulsions are general, which occurred in 16 cases, they approximate closely to the epileptic type, and like it are sometimes more marked on one side of the body than the other. This was especially noteworthy in one case, the convulsive movement being greatest on the paralyzed side. Complete coma almost always coexists with the convulsions, and these latter may sometimes alternate with contracture, sometimes precede it, or at other times follow or take its place. In 6 instances such was the case, in 3 the convulsion appearing with, in 1 following, and in 2 others alternating with this symptom. Brouardel thinks that convulsions occur in one-third of the cases where contracture is present in secondary ventricular hemorrhage, a proportion, as we see, about the same as in the primary form. In 11 of the 21 cases, the blood was in all the ventricles; in 4 in one lateral alone; in 3 in both lateral and the third; in 2 in both lateral only, and in 1 in the third and fourth ventricles. Pressure was thus brought to bear directly upon one or both corpora striata in every case but one, and upon the medulla oblongata in 12 cases. In most of these the blood was effused rapidly and to a large amount, so that the pressure was suddenly brought to bear upon the motor centres, and in this, I think, is to be found the explanation for the existence of convulsive manifestations in ventricular hemorrhage. A careful comparison of simple and complicated cases shows that the variety or extent of the complication has no essential bearing on the occurrence of convulsions, the ventricular extravasation itself being undoubtedly the inducing cause. One patient presented a peculiar motorial symptom somewhat analogous to that obtained by Nothnagel by irritation of his so-called *nodus cursurius*. The patient, a man, attempted to hang himself, but before life was extinct was cut down. As soon as he was liberated, he quite unconsciously rushed madly forward and fell. He lived three days, and after death extensive effusion was found in the ventricles,

with most intense congestion of the cerebrum, the cerebellum being scarcely affected.

Paralysis.—Paralysis as a symptom of primary ventricular hemorrhage is of quite frequent occurrence, and differs in no way from that due to ordinary interstitial, encephalic extravasation; whereas, judging from statements by various authors (Aitken, Hughlings-Jackson, Roberts), who seem to base their conclusions on the fact that the extravasation with its pressure-effects involves both sides of the brain, the impression is that the paralysis is much more extensive. However, as will be seen, such is not the fact. I find paralysis noted in 30 cases. The usual form is the hemiplegic, since of these 30 cases, 19 were of this variety, 11 being left and 8 right sided. Of the 11 remaining cases, of 4 it is said all the extremities were paralyzed; in 1 the diaphragm alone was involved; in 1 both lower extremities were affected only, the arms being the seat of contracture; in 1 the paralysis was crossed, the face being affected on the right side, the arm on the left; and in 4 the seat of the paralysis is not mentioned. It is here, especially in the hemiplegic cases, that a positive and direct relation can be traced between the lesion and the seat of the paralysis. In the 11 left-sided cases, the extravasation was in all either confined to or most abundant in the right lateral ventricle; of the 8 right-sided cases, in 5 the blood was found in the left lateral ventricle only, the three remaining cases being indefinite, but still in all of them the blood was found in both lateral ventricles. In the 4 instances in which the paralysis involved all the extremities, blood was present in all the ventricles in 3, and in the third and fourth alone in 1. The case of diaphragmatic paralysis was one in which all the ventricles were distended with blood, while in the patient in whom contracture of the superior with complete paralysis of the inferior extremities existed, the hemorrhage was found equally in both lateral and the third ventricles. The autopsy of the instance of crossed paralysis, *i. e.*, right side of face and left arm, is very imperfect, but shows abundant extravasation in the left lateral ventricle only, with a little serum in the right.

In only 1 of these 30 cases did the corpus striatum suffer laceration, and here no relation between the paralysis and the ganglionic lesion can possibly be traced, since the former was confined entirely to the diaphragm. However, in the 29 remaining cases absolutely no destructive lesion either of the motor ganglia or motor tract existed. Hence, destruction of neither the motor centres nor of the motor conductile fibres will explain the occurrence of the paralysis. I believe that the solution lies in the fact that some part of the central motor system, generally one of the corpora striata, was rendered inactive by the sudden excessive anæmia induced by the direct pressure upon it by the effused blood, thus having a condition produced analogous to that due to cerebral embolism. As we have seen, in almost every, if not every instance the paralysis was on the side oppo-

site to the greatest amount of effusion, or a close connection could be traced between them. In the few cases in which recovery took place the paralysis was more or less permanent.

In six cases resolution of the extremities is mentioned. This is a symptom of the gravest import, indicating early dissolution, since in these cases it only appeared several hours or immediately before death. It is also a sign of very extensive effusion, for in every instance the post-mortem showed all the ventricles to be distended with blood. It sometimes precedes, coexists with, or follows contracture, and at times alternates with convulsions.

The sphincter ani is noted as paralyzed in two cases, the feces being discharged involuntarily in bed. In three patients there was involuntary discharge of urine, while in two the opposite condition existed, there being retention necessitating the use of the catheter.

III. *Disturbances of Sensation. Sensibility.*—Sensation may remain perfect, even though unconsciousness be complete, or there may be anæsthesia. This latter differs in degree, time of appearance, and in some few cases varies at different times in the same case. When present, it usually appears almost coincidently with the seizure, and is then generally profound. It may continue uninterruptedly throughout, or may vary, at first being complete, later partial, or even entirely absent. Thus in one case, at first there was entire loss of sensation, with complete coma, but on the third day, pinching of the extremities was followed by movements of all the limbs, the patient rolling slightly over in bed; in another case in the beginning with complete loss of consciousness, there was absolute loss of sensation, giving place on the second day, with improvement in the general symptoms, to improvident in this, but with recurring loss of consciousness there was again absolute loss of sensation. However, a direct relation does not always exist between the degree of coma and the degree of anæsthesia as might be supposed, for in several instances where the coma was complete, sensation remained intact. In every case in which there was anæsthesia, blood was found in both lateral and the third ventricles. I have no doubt that this symptom was often overlooked, my impression being that it is quite common.

Reflex Action.—In eight cases where reference is made to this point, the reflex phenomena were found more or less perfect in all but two. In all where it was present, the reflex movements were generally feeble, never violent, sometimes affecting the part irritated, at others all the extremities. In the two instances in which no reaction was obtained the patients were profoundly comatose, and on post-mortem blood was found in all the ventricles and very abundant. Nothnagel places the centre for the reflex process somewhere in the medulla oblongata. If this be so, abolition of reflex excitability should occur with pressure upon this part; in the cases with which we are dealing, with effusion into the fourth ventricle. In

only one of our cases in which this phenomenon persisted was blood present in this situation, and in this case the reflex movements were very feeble, appearing only in the legs and not in the arms, thus lending a certain amount of strength to the truth of Nothnagel's theory.

Conduction.—In my own case it was possible early in the course of the disease to determine the condition of conduction, and here it was good. In no other case can I find it referred to.

Giddiness or dizziness may sometimes appear as an early symptom, usually before the actual symptoms of the attack can be considered to have set in. In the five cases in which I find it recorded it was in every instance the first sign of impending trouble noticed by the patient, and was rapidly followed by the violent symptoms of the attack. Its principal peculiarity was the suddenness of its appearance. Cases beginning with this symptom are usually gradual in their onset, the symptoms as a rule not being very violent, and life is generally prolonged for some time.

Headache.—Cephalalgia when it occurs, and this it does with comparative frequency, always appears as an early phenomenon, either at the very beginning of the seizure, or soon after the first symptoms have made their appearance. It may be very slight or so intense as to cause the patient to cry out, in fact in several cases in which coma was present, the patient was observed to pass his hand over his head as if in pain. The character and seat of the pain vary greatly, having no special characteristics worthy of mention. The fact that headache appears early seems to bear no relation to the degree of violence or rapidity of the attack, nor does it seem to depend on the seat or extent of the ventricular hemorrhage. In all but four of the cases where it was present either free blood was found over the meninges, or these were the seat of marked congestion.

IV. *Disturbances of the Organs of Special Sense. Ears.*—In one instance, a case of hemorrhage into the third ventricle alone, the patient complained of buzzing in his ears. This is the only case in which any auditory symptom was noticed.

Eyes.—In a few patients the eyes are open and staring, in some the eyelids are closed. Out of five cases, the eyes were suffused in two; and in two the eyeballs were described as rolling in their sockets, in both the symptom appeared, however, only a short time before death. The condition of the pupils varies greatly. In eight cases they were equally contracted; in four equally dilated; in two one pupil was contracted, the other dilated. In three cases the reaction to light was good, but in five others there was absolutely no reaction, these, however, being all cases of profound coma. We thus notice that there is nothing characteristic or certain in the condition of the pupils; though I have been able to trace a direct connection between the seat of the hemorrhage and the state of these latter. In all cases in which the pupils were either equally dilated or equally contracted blood or serum was found so disposed in the ventricles

as to give rise to irritation or pressure upon both sides of the brain. Thus in the four cases in which the pupils were uniformly dilated blood was present in all the ventricles; and in the eight instances where they were equally contracted, in three the hemorrhage involved all the ventricles; in two both lateral and the third, in one the third and fourth; serum filling the two lateral; in one one lateral, the other lateral containing a sero-sanguinolent fluid, and in one a lateral and the third and fourth ventricles, the remaining lateral containing serum. In the two instances in which one pupil was dilated while the other was contracted, blood distended one lateral ventricle only in one, and one lateral and the third in the other, the dilated pupil in each instance being on the same side as the lateral ventricle in which the blood was found. The condition of the pupils may vary at different times, being, perhaps, contracted at one examination, while at another they may be dilated, the rule, however, being seemingly that they remain the same throughout. The degree of contraction also differs greatly, varying from a pin's point up to a degree which is hardly observable. The same is true of the dilatation. When insensibility to light exists it is absolute, at least it was so in the five cases mentioned. In only one patient was strabismus noticed, and here it is mentioned as being merely transient, appearing and disappearing at intervals. Conjugate deviation of the eyes, which according to Bastian is sometimes present from the first in cases of secondary ventricular hemorrhage, I find recorded in no instance of primary hemorrhage, but in two cases lateral deviation of the head (a condition which, according to Prevost is often associated with lateral deviation of the eyes) was noted. The latter author considers this symptom characteristic of lesion in or near the corpus striatum, but Hughlings-Jackson affirms that it also occurs with meningeal hemorrhage. Ferrier found in rabbits that rigid rotation of the head to the opposite side followed irritation of one corpus striatum, thus lending support to Prevost's supposition. In the two cases above referred to the condition of the eyes is unfortunately not alluded to. In both blood was found in the lateral and third ventricles, and in both the septum lucidum was destroyed.

Speech.—Loss of speech may be partial or complete, varying from a mere inability to articulate clearly to complete aphasia. In eleven patients, although they were known to be sufficiently conscious to comprehend what was going on about them, and to understand questions put to them, symptoms referable to defects of speech were present, in some existing as a mere difficulty in clear utterance, in others as a partial loss of the power of speech, answers being in monosyllables as "yes" and "no," in one case, and "well" and "oh dear" in another. In both these cases the aphasia finally became complete. In several patients the loss of speech was absolute from the beginning. Whether these symptoms are directly related to the seat of the lesion, or secondarily through lingual paralysis,

I am unable positively to determine, but I am inclined to believe that it is dependent upon the latter condition. In two remaining cases the voice was stammering.

V. *Disturbances of the Alimentary Canal. Mouth.*—Frothing at the mouth, which is an occasional symptom in other forms of intra-cranial hemorrhage, is here comparatively frequent, for in ten cases a frothy material, varying in character from a simple mucus up to a blood-stained saliva, gathered about the lips or in the buccal cavity. In three the collection occurred during convulsion, the instance in which it was bloody being one. In only six cases is it stated that the mouth deviated. In two others the patient lay with the mouth open, both being instances of deep coma.

Tongue.—In only three cases is the condition of this organ mentioned, and in only one of these did it on protrusion deviate. In the other cases it is described as being simply dry in one, and as being tremblingly and slowly protruded in the other.

Deglutition.—In the large majority of cases the patients were able to swallow freely throughout the entire course of the attack, but in four, difficulty or absolute inability of deglutition existed at some time, in one patient only appearing early, and in this case the blood was found in all the ventricles, while in the others the fourth ventricle was free, in these the symptom only appearing a short time before death and coexisting with profound coma.

Sickness or Malaise.—Early in the attack, usually as an ushering-in phenomenon, this symptom was noticed in three cases, in none, however, existing to anything like an extreme degree.

Nausea and Vomiting.—In twelve cases either one or both of these symptoms were present, usually early, sometimes at the very beginning. In two, nausea alone appeared. The vomited matter varied in character from the contents of the stomach to a bilious material; in some it was slight, in others recurring and persistent. In one instance, it bore a close resemblance to ordinary cerebral vomiting, evacuation of the stomach without previous nausea taking place, on the patient raising her head in bed.

Constipation.—Like as in other cerebral affections constipation is the rule, in three cases being so aggravated as to require artificial evacuation by enemata.

As will be seen, the symptoms referable to the alimentary canal are of but little importance in the diagnosis of the disease under discussion.

VI. *Circulatory Disturbances. Pulse.*—It can hardly be said that there is any form of pulse which is characteristic of primary ventricular hemorrhage. Still, in many cases, we meet with a certain similarity approximating to this condition. It varies in the different stages, the pulse of the early period differing greatly from that of the later stage.

Immediately following the onset or within a few hours thereafter, we find a slow, full, strong, usually regular pulse, in fact, a pulse which has come to be regarded as indicative of intra-cranial mischief. Sometimes it is soft and small from the beginning, at other times rapid, and at others irregular and intermittent, this latter form occurring coincident with symptoms of collapse, and is to be considered as rather dependent upon this condition than on the hemorrhage. Later on the pulse gradually changes from its cerebral type, becoming rapid and weak, then feeble, then irregular and intermittent, and finally almost imperceptible, thus showing a slow yet steadily increasing loss of heart power. The pulse varies greatly in frequency, in one case falling as low as 40 beats in the minute, in others rising as high as 152. In some cases it remains about normal throughout, never going above 80 beats per minute. The slow pulse appears early, whereas in the three cases in which 120 or more pulsations were reached this only occurred just before death. A comparatively high pulse is, therefore, of bad import. The soft pulse occurs but rarely, having been noticed in but two instances. The slow pulse is mentioned in eight cases, in every one appearing early; in nine patients the pulse was full; in three strong, and in ten rapid. The irregular and intermittent pulse appeared in eight cases, usually late, but in two of these at least early, both, however, being instances of collapse. On reaction, in both, the pulse became full and tense or more developed.

The pulse, therefore, which may be considered as characteristic of primary intra-ventricular hemorrhage in the early stage, although strictly speaking it is no more distinctive of this than of any other form of intra-cranial disease, is the slow, full, hard pulse; while later, when the powers are becoming exhausted, it becomes rapid and feeble. As already stated, in a few cases it remains normal throughout. In one case the pulse continued some minutes after the cessation of respiration.

VII. *Disturbances of Respiration. Respiration.*—In 28 cases the state of the respiratory function is given, and in all but five it was more or less stertorous at some period of the disease, the stertor in the majority of cases (17) appearing early, in six instances only occurring late. It varies in degree in the different cases from slight puffing to loud noisy breathing, in some gradually increasing, in others being at its greatest from its inception. In a few instances instead of increasing it slowly diminished, as in one case giving place to a slow irregular yet quiet respiration. Of the five remaining cases, in one it is described as regular and normal throughout; in two as simply difficult; in another as very shallow and slow, but regular and equal; and in a fifth as quickened, being 36 to the minute. In one patient in whom stertor existed, the respiration was also hastened, reaching 45 per minute. In three cases it was slow; in three irregular; in one there was complete paralysis of the diaphragm, respiration being wholly thoracic, whereas in another instance, the con-

trary prevailed, distension of the chest cavity being only carried on by the diaphragm. In one case respiration actually ceased some minutes before the pulse, this being the one in which diaphragmatic paralysis existed, a condition which I have seen simulated in a case of fracture at the base of the skull with extensive meningeal hemorrhage. In another patient, a short time before death, stertor alternated with entire suspension of the respiratory act. In such cases we would expect, reasoning from physiological principles, pressure upon the medulla oblongata so acting as to involve the respiratory centre, and in those where cessation of respiration preceded that of circulation, this centre before the circulatory centre. In these patients the fourth ventricle was invariably found filled with blood.

VIII. *Temperature. Chilliness or sense of coldness* is spoken of as present in two cases, in one being described as the very first symptom appearing, and in the other among the earlier signs of the seizure. In neither case did it amount to an actual chill, but in the second patient it was accompanied by shivering.

Temperature.—In only a few patients was reference made to the body heat, and in these few so indefinitely that but little can be deduced therefrom. In four cases it is mentioned of the extremities that they were cold, this coldness being noticed, however, only a few hours before death. In a few others the skin was observed to be cold. Such cases are of but little or no importance, as they establish nothing. In three cases the history states that the body heat was natural, but as the thermometer was not used, such statements can hardly be received. In only six cases was fever observed, and in only one of these, my own, were thermometrical registrations obtained. Of the other five it is merely stated that the patient suffered from fever more or less marked. In my own case, the temperature obtained was as follows. On admission to hospital, Sept. 26th, being the second day of the disease, the temperature being taken in the rectum, 101½°; September 27th, A. M. 100°, P. M. 101°; September 28th, A. M. 102°, P. M. 102°; October 2d, P. M. 103°. Here we have at first a slight elevation followed by a slight fall, not, however, reaching the normal, then a second steady uninterrupted rise up to the time of death. Whether there was an initial fall immediately after the seizure, as observed by Bourneville in cases of ordinary cerebral hemorrhage, I am unable to determine; but in other respects the temperature curve is exactly that obtained by him, that is, death being delayed several days, the initial fall is followed by an almost stationary period, and finally, a stage of great elevation continuing up to death. One case, however, can hardly be said to prove anything, and further observations are therefore necessary. Speaking of secondary cases following hemorrhage into the corpus striatum or optic thalamus, Bastian (loc. cit. p. 649) states that in each a decided fall in the temperature occurs (as low as 96° in the rectum or thereabouts), remaining so for an hour or two, especially where

the hemorrhage into the ventricles continues. If death does not speedily follow, we then have a rapid rise continuing until death. Dieulafoy (*Gaz. Hebdom. de Méd. et de Chir.*, 20 Avril, 1877, p. 270) finds in secondary cases an elevation of temperature which remains until death.

IX. *Disturbances of the Urinary Apparatus.*—The symptoms referable to this system of organs are unimportant. The retention or involuntary discharge of urine has already been referred to. A number of cases were marked by the presence of albuminuria, but this was found on post-mortem to be due to organic kidney changes.

X. *Surface Symptoms. Expression of Countenance.*—This seems to be the dull apathetic type, since in the three cases in which it is described it was of this character.

Condition of the Surface.—Paleness of the face is a symptom of ill-omen, especially when it occurs early. It is noted as present in seven cases, six times appearing early, once late; in the former cases life in no instance was prolonged beyond twelve hours, while in the latter this symptom only made its appearance a short time before death. In eight cases the face is described as congested, red, flushed, or dusky, this state showing itself early in all but one of the cases. In such patients life was usually prolonged for several days. Coldness of the hands and feet or of the entire surface of the body was present in ten cases, in all early. Death in these cases, as a rule, soon took place, though it is not a symptom of as bad import as paleness. In one patient the *tâche cérébrale* was evident, though not marked, and in another, on the second day, death taking place on the third, the body was bathed in a profuse perspiration. Sweating also occurred in several other cases.

XI. *Apparent Improvement.*—It has long been the belief that cases of secondary hemorrhage into the ventricles are marked by a period of apparent improvement, this period being presumed to indicate a temporary cessation of the extravasation into the brain substance, preceding the eruption of the blood into the ventricles, which latter event is supposed to have occurred when sudden complete coma, contracture, paralysis, etc., present themselves. Such a presumption can hardly be the entire truth, for, I find in ten of my primary cases a similar interval of seeming improvement. This I would explain on the ground that for the time the hemorrhage having ceased, the brain has accustomed itself to the pressure, and functioning is partially or completely restored, the improvement varying from that which is very slight to a perfect restoration of consciousness. A second hemorrhage occurs and relapse follows. In every one of the ten cases the improvement was merely transitory and in every instance was followed by symptoms of the most aggravated kind, persisting uninterruptedly until death, no second remission being observed in a single case.

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ARTICLE IV.

EXPERIMENTAL STUDIES ON THE TRANSPLANTATION OF CARTILAGE.

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THE question of the origin of pus, or of new cells within adult tissues under pathological conditions, although for many years a theme of the most lively interest, yet first became capable of precise discussion and investigation upon the definite enunciation of the principles of the cellular pathology by Virchow, now somewhat more than two decades ago. In accordance with the principles formulated with such precision, and maintained with such learning and enthusiasm, and with the facts then at his command, it seemed, indeed, beyond a doubt, that where larger or smaller groups of new cells appeared in the tissues, where fewer or only one were wont to be, he was justified in assuming, as he did, that these were the direct offspring of the original cell or cells.

This position, however, was soon shown not to be as impregnable as it seemed, for in 1863, Recklinghausen showed, what Virchow had never dreamed of, that certain cells possessed the capacity of changing their position in the tissues, of wandering; and it was soon demonstrated that there were communicating spaces in the tissues through which these wandering cells could, and did find their way, and that these spaces were in many cases just those in which the proliferating cells of Virchow lay.

It was not long before Cohnheim, repeating a forgotten experiment with such directness of purpose and significance of conclusion, as to entitle him to all the credit of an original discovery, found out where such wandering cells could come from—the bloodvessels. After this, whenever such abnormal collections of cells were found in the tissues, two possibilities, instead of one, presented themselves as to their origin; they might be the offspring of cells belonging in the tissues in question, or they might be cells or their offspring which had come in from somewhere else, most probably from the bloodvessels.

And still, to-day, notwithstanding the many most elaborate and painstaking investigations which have been made for the direct purpose of determining which of these two factors, the "fixed cells" on the one hand, or the "wandering" or white-blood cells on the other, are most concerned in the production of new cells in the tissues, under varying conditions, and especially in that complex of phenomena commonly known as inflammation, the old alternative, in many cases, persistently presents itself, and we are unable to give an absolute decision.

Most observers are, indeed, convinced, that under differing, or often the

same, conditions, both sources of origin of the new cells should be recognized, but are not able to decide, in many special cases, which is the more important. It might seem that with such a degree of unanimity of opinion, the absolute decision of this question in particular cases is of little importance, and this, from the so-called practical stand-point, may, perhaps, be true, but from the broader stand-point of biological science, it is of the extremest significance, because it has to do with the determination of the capacities of several varieties of that material in which life finds expression and which is somewhat loosely called protoplasm.

If many years of patient investigation have not brought to us a simple and precise formula, in which the great group of changes usually huddled together under the name of inflammation can be adequately expressed, this is not the fault of the investigators, but is owing to the complexity of the theme, and it is a most encouraging circumstance that the more fascinating labor of generalization should be for the moment withdrawn from the front, while incalculable pains are being taken to elicit, without direct reference to their ultimate application, and from various and sometimes obscure and unpromising sources, those simple facts in the life-history of cells without which all great generalization on this theme must ever be somewhat premature.

At the present time the determination of the proliferative capacities of special forms of cells, and their power of being directly converted into the cells of other forms of tissue under changed conditions, would seem to promise more definite results, in view of their ultimate application to the inflammation question, than attempts at a direct solution of the general question of the origin of pus.

Two varieties of tissue have seemed, from the very first, to be better adapted than others for the investigation of this subject, because both seemed comparatively simple in structure, and both were without blood-vessels; these are the cornea and the hyaline cartilage.

In the earlier days of the discussion, following Cohnheim's discovery, it was to the cornea that most attention was directed, and many facts of inestimable value which have been elicited attest to the skill and devotion given to this object. Still the definite answer remains in abeyance; for, in the first place, the cornea appears, on closer investigation, to have by no means the simple structure at first assumed. It is permeated by numerous communicating lymph-spaces, in which the corneal cells lie, and through which white blood- and other cells can wander; and the exact shape and character of the corneal cells it is very difficult to discover. These cells, moreover, under the same conditions in which an increase of cells occurs, are subject to certain degenerative alterations which it is sometimes almost impossible to distinguish from active proliferative change. The commonly employed method of staining with gold chloride, introduces still again elements of uncertainty which force us to accept

conclusions drawn from corneæ treated in this way, with considerable reserve. So that it is not strange that of late the cornea has been less frequently the object of research, and more attention has been devoted to the cartilage.

While some plausible objections may be urged against this tissue as a medium of investigation of inflammation, such as the assumed indolent character of its cells, and the firmness and unyielding nature of its basement substance, which would tend to retard the reaction of its cells against irritative agencies, etc., these are at best of a negative character, and are quite overbalanced by the positive advantages which it presents. Its structure, in the first place, is quite well known, and, what is very important, simple in character; and although the existence of delicate lymph-channels between the cells has been urged of late, with no small degree of reason, they are, even if they exist in the abundance assumed by some authors, so very small as to exclude the possibility of the passage through them of the white blood-cells or other wandering cells. The cartilage-cells, moreover, have been shown to be by no means incapable of considerable active change under suitable conditions.

It is not the purpose of this article to give even a *resumé* of the experimental researches on cartilage, but to record a series of experiments performed upon it, not with direct reference to the inflammation question, but with the view of determining the vital capacities of its cells when placed under certain abnormal conditions, capable of variation and control.

The desirability of research of this character was suggested by Prof. Julius Arnold to the writer some time ago, while a student in his laboratory in Heidelberg; and he wishes to express here his gratitude to his teacher for the suggestion of the theme as well as for the judicious and inspiring counsel so cordially given him during the early part of the investigation.

It was originally designed to limit the work to the cartilage of the frog, and the simple question was propounded, "What changes are to be observed in bits of hyaline cartilage, from the frog, when placed in the subcutaneous lymph-sacs of a living frog and left for varying periods?"

The very simple operation required, was performed on a considerable number of animals, the fragments of cartilage being transferred at once from a freshly-killed frog to the various lymph-sacs of other living frogs. These were removed after having been within the sacs for periods varying from two to forty-four days, and preserved, some in Müller's fluid, some in osmic acid, and some stained with gold chloride. The fragments were found, for the most part, lying free and unattached in the lymph-sacs, and presented in thin sections nothing but the usual degenerative changes produced by longer or shorter maceration in indifferent fluids. In a very few cases, however, the fragments were found inclosed in granulation-tissue, and attached either to the skin or to the muscle-bellies or fasciæ.

The minute changes observed in such fragments will be mentioned further on, it being undesirable to give a full description of them here, since the cases in which anything but absolutely negative results were obtained were so few, irregular, and long delayed, that it soon became evident that neither the probable duration of the life of the investigator, nor the average life of frogs, would suffice for the solution of the problem in this form.

Some control experiments, however, performed on rabbits, gave indications which led to the hope that the warm-blooded animals might afford a more satisfactory answer to a similar inquiry; and, in fact, the results, now to be recorded, of experiments on rabbits, instituted at a later time, and extending over a period of two years, show that this hope was not without foundation.

The question propounded in the latter series was equally simple. What changes, if any, occur in fragments of hyaline cartilage, transferred directly from a freshly-killed rabbit, to the subcutaneous tissue of a living animal of the same species, and left for varying periods; and further, how do such changes differ from those observed when cartilage whose cells are dead, is subjected to the same conditions?

Somewhat similar questions have indeed been partially answered so far as the general fate of such transplanted fragments is concerned, by Ollier, Bert,[1] and others, but the need of a more detailed and microscopic analysis seems to justify its renewal. In this investigation therefore especial attention was paid to the comportment of the cartilage-cells.

Methods of Investigation.—These were of the simplest character. Very small fragments of hyaline cartilage—thin pieces from the head of the femur, or from the costal cartilages, were taken from a freshly-killed rabbit, great care being exercised that no perichondrium remained adherent, and were thrust immediately into the subcutaneous tissue of a living rabbit, through a small incision in the skin. Careful records were made of the position of these fragments, and the incision closed by silk sutures. Antiseptics were not used, but the most scrupulous care was observed in the cleanliness of the instruments, and the exact closure of the little wounds, the edges of the latter being everted before drawing together, so as to insure the apposition of raw surfaces. The wounds, almost without exception, healed by first intention, and in no case did the animals exhibit any evidence of constitutional reaction, even when a number of insertions were made at once. In cases of momentary delay, between the removal of the cartilage from the dead animal and their transference to the living one, the fragments were placed in a half per cent. solution of sodium chloride, kept at a temperature of about 38° C.

In this way the *living* cartilage was transplanted. For purposes which

[1] Ollier. Traité Experimental et Clinique de la Regéneration des Os, etc., 1867, t. i. Bert. Sur la Greffe Animale. Comptes Rendu de l'Acad. des Sciences, t. 61, p. 567.

will presently be evident, the cartilage-cells in some cases were *killed* before insertion into the living animal; but the same care was in all cases observed in the conduct of the operation, in order to insure uniformity of conditions. The killing of the cartilage-cells was accomplished in a variety of ways. Some bits were simply dried for several hours on a plate of glass at ordinary temperatures; others were soaked for several hours in strong alcohol, others in a saturated alcoholic solution of carbolic acid; still others were kept for several minutes at the temperature of boiling water; and finally in some, the end was accomplished by the protracted passage through them of a strong interrupted current.

On removal, after varying periods, the fragments of cartilage, or what remained of them, or the tissue replacing them, were placed at once in Müller's fluid, subsequently in alcohol, and thin sections were stained first lightly with hæmatoxylin, and then deeply with eosin and mounted in glycerin. This simple method of double staining cannot be too highly commended for such studies as these, for the eosin exhibits so exquisite a selective power for the cell-bodies—in branching cells for their finest ramifications—that it rivals even gold chloride, in many cases, in the clearness of the pictures elicited, and does not seem to share its well-known imperfections.

More than two hundred bits of cartilage were inserted at different times, and were removed at periods varying from 1 to 399 days. Thin sections were made from all of these, and from many of them a series of consecutive sections. Altogether, about twelve hundred sections were prepared and studied. This large number of specimens rendered the study of the consecutive stages of the absorption process quite complete, and will justify a much more definite, positive, and condensed description of it than would otherwise be permissible.

The fate of such bits of cartilage, in which the cells are either living or dead, is in brief as follows: at first a greater or smaller number of small spheroidal cells collect around them; the bloodvessels in their vicinity become dilated, and within a few days—sometimes within a few hours—they become inclosed in a larger or smaller mass of granulation-tissue whose bloodvessels may be readily injected from the aorta. From this period the course of affairs is subject to considerable variation.

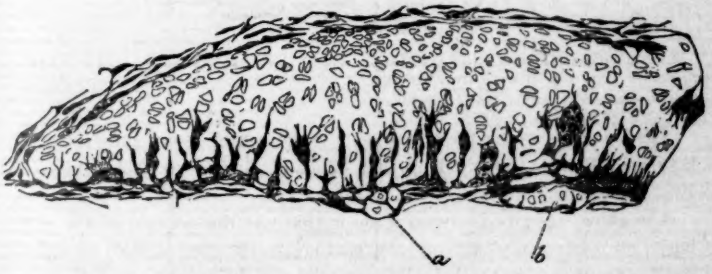
While the inclosing granulation-tissue becomes in all cases denser and firmer, and gradually assumes the character of young fibrillar connective tissue, the inclosed cartilage may remain almost absolutely unchanged for weeks and months, the living cells retaining their normal character most perfectly; or, on the other hand, it may commence to disappear almost immediately after its insertion, and in a few weeks be entirely absorbed, its former seat being indicated only by a small nodule of new connective tissue, which, itself, finally disappears. The long persistence of the bits

is more apt to occur in fragments inserted with the cells yet living; still such fragments not infrequently disappear very soon. The writer was unable to note any fixed conditions which seemed to determine the rapid or slow absorption of the fragments.

In only one case was there any actual new formation of hyaline cartilage, and this was in the form of a nodule so small as to be evident only in a microscopical section. The bit of cartilage from which this new growth of cartilage occurred, was from an adult animal, and the new cartilage was distinctly embryonal in structure, the cells being closely packed together with a little characteristic basement-substance between them.

In considering the microscopic changes observed in the process of absorption, it will be convenient to describe first those which occur in bits of cartilage in which the cells were dead when inserted beneath the skin. It is not necessary to describe in detail the appearance of the cartilage-cells under these conditions, since they are familiar to all. The absorption in these cartilages takes place entirely from without, there being, as would be expected, absolutely no reaction on the part of the cartilage-cells, no matter how long the fragments remain in the living animal. The absorption occurs by means of a growth inwards of cells which are col lected around the cartilage, the basement-substance of which becomes at

Fig. 1.



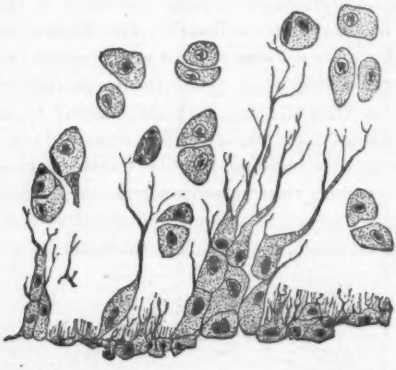
Shows a transverse section of a bit of cartilage from the head of the femur, in which the cartilage-cells were killed before transplantation, by soaking for an hour in a saturated alcoholic solution of carbolic acid. It was removed on the forty-first day.

the same time, finely but distinctly fibrillated. The ingrowing cells seem to channel their way in the basement-substance as they go, assuming as they do so either long, pointed, or bizarre branching shapes. They sometimes work their way into the cavities in which the shrunken and dead cartilage-cells lie, but in most cases they seem to avoid these, advancing between the cells along the boundaries of the so-called "cell territories," thus often forming a cellular reticulum in the meshes of which lie the

dead and shrunken cartilage-cells, each surrounded by a more or less spheroidal mass of basement-substance, presenting the appearance seen in Fig. 1, *a* and *b*.

Thus gradually the whole piece of cartilage may be permeated by cells or cell-masses, growing in from the surfaces, and sooner or later these are accompanied by bloodvessels which can be easily injected from the aorta. The fragmentary remnants of the cartilage now soon disappear, leaving behind a tissue resembling mucous or embryonal tissue, which by little and little assumes the character of ordinary adult connective tissue.

Fig. 2.



Shows a portion of a bit of cartilage transplanted with the cells alive and removed on the forty-first day. Ingrowth of cells from the surface. Commencing proliferation of cartilage-cells within.

The branches which the active cells at the surface send into the cartilage are often extremely long and delicate, similar to those shown in Fig. 2.

The above described process of absorption was the same in all the cartilages, no matter in what way the cartilage-cells were destroyed beforehand, except that in the boiled fragments, the disintegration of the basement-substance was more speedy and the resolution into cell territories more marked than in those treated in other ways.

Strikingly in contrast to these are the pictures which those specimens present in which care is taken to preserve the cartilage-cells alive; for while the same absorption occurs at the surfaces by ingrowing cells and bloodvessels, here the cartilage-cells themselves play, in the most unmistakable manner, a very important part, by changing their shape, by proliferating, and by absorbing the basement-substance in their vicinity. These three modes of expressing their activity, can be best appreciated by reference to the figures. The general character of the change in shape—

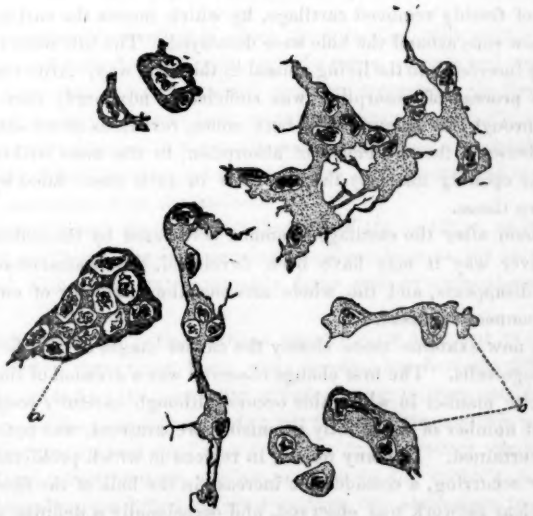
which very often occurs without, at first, any tendency to proliferation, but which is necessarily associated with absorption of the basement-substance—is shown in Fig. 3. The cells may become elongated, or may send out processes, which, at first short and often ragged, grow larger and longer and better defined, until a complete irregular network may be formed entirely within the substance of the cartilage, at considerable distances from the surface, and quite independent of any change which may be occurring there.

Fig. 3.

Cells transplanted alive; commencement of change of shape. 131st day.

When so much channelling of the basement-substance has occurred as this change in the shape of the cells involves, proliferative changes usually appear, and then in place of a simple cellular network, there are larger and smaller clusters of cells at certain points joined together by cell-processes.

Fig. 4.



Transplantation with cells living. Proliferation and channelling of the basement-substance. *a*. Enlarged cavity containing numerous nuclei without differentiation of cell-bodies. *b*. Elongated cells showing changes in the nuclei. Removed on the 82d day.

Not infrequently, the first active change in the cartilage-cells consists in proliferation; the regular cavities in which the cells lie becoming simply and symmetrically enlarged, but at first not at all branched. Later,

some of the newly-formed cells in the cavities may be seen to have commenced sending out processes, which work their way through the basement-substance, and thus the various cell-groups are finally connected together, and we have a cellular network, with cell-clusters at the nodal points and with irregular fragments of cartilage basement-substance in the meshes, presenting a picture like that represented in Fig. 4. Although, at first sight, the cellular networks thus formed seem to resemble those produced by the ingrowing of branched cells from the surface, a more careful examination shows a striking and fundamental difference. In the former case, where the cartilage-cells are dead and entirely inactive, the channelling of the basement-substance occurs, in the great majority of cases, between the cell territories, leaving in the meshes of the cell-net the shrunken cartilage-cells surrounded by a greater or less amount of basement-substance; whereas in the latter case, where the activity is in the cartilage-cells themselves, the fragments of basement-substance are entirely devoid of cartilage-cells or old cell-cavities, and are much more irregular in shape.

This difference was strikingly shown in fragments in which the cartilage-cells over a limited area were killed, while others near them were left alive. This was accomplished by thrusting a red-hot needle through thin bits of freshly removed cartilage, by which means the cartilage-cells in a narrow zone around the hole were destroyed. The bits were then immediately inserted into the living animal in the usual way. After remaining until the process of absorption was sufficiently advanced, thin sections passing through the opening and both zones, reveal, as above stated, the contrast between the two modes of absorption, in the most striking manner. The opening made by the needle is in such cases filled by young connective tissue.

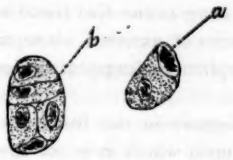
Very soon after the cartilage becomes permeated by the cell-network, in whatever way it may have been developed, the basement-substance entirely disappears, and the whole assumes the character of embryonal fibrillar connective tissue.

Let us now examine more closely the earlier stages of proliferation in the cartilage-cells. The first change observed was a division of the nuclei. The precise manner in which this occurs, although carefully sought after in a great number of apparently promising preparations, was not satisfactorily ascertained. In many nuclei, in regions in which proliferation was evidently occurring, a considerable increase in the bulk of the fibres of the intra-nuclear network was observed, and occasionally a definite grouping of these fibres into more or less conical rayed figures at the opposite poles of the nucleus; but between the forms and the perfect, newly developed nuclei, definite intermediate forms were not found. The newly formed nuclei were sometimes inclosed in the body of the cell, but in a great

many cases were seen lying completely outside of the latter and pressed closely up against the capsule, in the manner shown in Figs. 2 and 5.

In many cases there was a distinct new formation of separate cells within the enlarged cavity, Fig. 5, *b*; in others there seemed to be simply a

Fig. 5.



a. New formation of nucleus. *b*. New formation of nucleus and separate cells. 41st day.

multiplication of nuclei, but no differentiation into separate cell-bodies. (Fig. 4, *a*.) When completely developed cells were formed they were in no case separated by the formation of a partition of basement-substance across the cavity, such as is observed in the proliferation of cartilage-cells under normal conditions; for example, in growing cartilage in the young animal.

In a considerable number of cases the enlarging cells were very much elongated and bulbed at the ends, and the nuclei at each end were joined by a narrow, often curved or twisted structure resembling the nuclei themselves; or appeared to have been recently separated. See Fig. 4, *b*.

These active changes in the cartilage-cells are usually unassociated with fibrillation of the basement-substance, which is so constant an accompaniment of absorption from the surfaces.

In cases in which there was calcification of the cartilage, as in some of the costal cartilages, the cells causing the absorption at the surface were associated with many extraordinarily large and irregular-shaped giant-cells.

The cells near the perichondrium usually show apparent proliferative changes earlier than those lying more deeply; but here the difficulty of absolutely excluding the possibility of cells coming in from outside sources would suggest the propriety of laying but little stress upon this point.

The above-mentioned cartilages from the frog, in which changes were observed, presented pictures similar to those in the rabbit's cartilage in which the cells were killed before insertion, the absorption in all cases occurring by means of cells growing in from the inclosing granulation-tissue.

Conclusions.—These experiments show that in the rabbit the cells of bits of cartilage transplanted alive, may live on unchanged in their new situation for many months; or, that they may lead to the new formation

of embryonal cartilage; or, that they may, on absorption of the basement-substance, change their shape and size; or, that they may undergo active proliferation, and take part directly in the formation of young forms of connective tissue, similar to those produced by cells from other sources. They show, furthermore, that bits of cartilage in which the cells are killed before transplantation, may be entirely absorbed by means of cells and bloodvessels from the young connective tissue which encapsulates them; and that this same process of external absorption occurs hand in hand with the internal absorption in fragments whose cells are transplanted alive.

It will be seen by reference to the literature of this subject, which is already extensive, and upon which it is not the purpose of the writer to enter here, that these results do not reveal any special capacities in cartilage-cells which have not been already assumed by investigators of this theme; but as these studies have been heretofore largely confined to natural pathological changes, or, when experimental, have been usually incapable of such definite control and variation, the above series of experiments seem worthy of record, especially on account of the greater certainty which they impart to the assumption of the capacity of cartilage-cells under changed conditions, to participate directly in the formation of other forms of tissue. The bearing of this upon the question of the production of new cells in inflammation, after what was said at the commencement of this article, is sufficiently obvious without further remark.

Absorption pictures similar to some of those described above not only are frequently seen and have been repeatedly described and figured in some of the ordinary diseases of cartilage, but are common, and often extremely puzzling, in certain of the complex tumours of the parotid and submaxillary glands.

ARTICLE V.

OPENING AND DRAINAGE OF CAVITIES IN THE LUNGS.[1] By CHRISTIAN FENGER, M.D., and J. H. HOLLISTER, M.D., of Chicago, Illinois.

IT is only a little more than a decade since Professor Mosler, of Greifswald in Germany, conceived the brilliant idea of combating cavities in the interior of the lung by surgical means. It was natural that the consumptive cavity, being the most common in the lungs, and the variety which offered the most desperate resistance to medical treatment, should be the first selected for a trial, for the following reasons:—

I. The superficial wall of such cavities was known to be adherent, in most cases, to the wall of the chest; consequently the cavity could be

[1] Read before the Minnesota State Medical Society, June 20, 1881.

opened without much danger of opening the pleural cavity, and thereby causing a fatal pyo-pneumothorax.

II. It was believed by a large part of the profession that infection of the still healthy lung-tissue was caused by aspiration of the liquefied cheesy matter contained in the consumptive cavities, and this, when brought in contact with still healthy bronchial tubes, would cause endo-bronchitis and peri-bronchitis, which were shown by Virchow to be among the most common features in the consumptive destruction of lung-tissue.

Mosler opened and drained a superficial consumptive cavity, using a silver drainage-tube. The result, however, did not fulfil the expectations. The patient died in due time from the pulmonary consumption, which had progressed notwithstanding the operation. As a consequence of this, the surgical treatment of consumptive cavities was abandoned, to remain in the history of medical science only as an interesting experiment.

But although Mosler's operation was of no avail in the treatment of pulmonary consumption, it accomplished this much good, that it called the attention of the profession to the surgical treatment of cavities in the lungs, and demonstrated that such cavities might be opened and drained without any of the dangers or inconveniences which, from *à priori* reasoning regarding a hitherto untried surgical procedure, might be expected to arise.

The next step in the surgery of the lungs was to attack less malignantly destructive pathological processes, which, as we know from observation of like processes in other tissues of the body, may terminate in recovery. These processes include suppuration and gangrene of lung-tissue, in other words, abscesses and pulmonary gangrene.

Cavities arising from acute pathological processes in the lung-tissue, naturally present themselves as objects for surgical treatment, when the anatomical conditions, that is, the position of the cavity, make such treatment possible, for the following reasons :—

There is, in the nature of these two pathological processes, nothing absolutely fatal, nothing necessarily progressive, as in tuberculosis, when this has developed so far as to form a large cavity. When the contents of a gangrenous or abscess cavity are entirely removed, there remains in the walls of the cavity no disease of the tissues which should necessarily prevent the closure of the cavity. This has been demonstrated by a number of cases of this kind, in which spontaneous recovery has taken place by evacuation of the contents of the cavity through the bronchial tubes.

But in spite of the possibility of spontaneous recovery, which in pulmonary gangrene rarely occurs, but is somewhat more common in abscesses, a number of cases remain, in which the size and progressive enlargement of the cavity and the gradual failing of the patient's strength, enable us to determine, a considerable time before death, that a fatal result is inevi-

table, and it is in such cases that we are tempted and have the right to claim assistance by means of surgical interference, for the following reason :—

The decomposing contents of such cavities, whether gangrenous fluid or ichorous pus, causes the progressive destruction of the lung-tissue *in loco*, namely, the increase in size of the cavities, as well as the general poisoning of the organism by absorption, with rise in temperature and decrease in strength. Besides this, the poisonous contents of the cavities are apt at any time, by aspiration through the bronchial tubes, to give rise to purulent bronchitis, broncho-pneumonia, or pleurisy in distant parts of the lungs. Any of these complications may at any time cause a sudden fatal termination before the time at which the gangrene or pulmonary abscess would come to its natural termination by exhaustion.

From the above considerations we are justified in desiring and attempting to evacuate the contents of such cavities, and in so doing, to expect not only to arrest the progress of the disease and avoid the complications from distant parts of the lungs, but also to cause the closure of the cavities so as to effect a definite cure.

The number of cases of acute cavities in the lungs in which surgical interference has been resorted to is as yet very limited, only six cases having been reported, and these within the last three years. Of these six cases only one, our own case, was successful, in so far that it terminated in a complete recovery.

But even from some of the cases that terminated fatally it was seen that immediate relief and temporary improvement in the patient's condition followed the operation to such an extent that the attention of the medical profession was drawn to the subject, and justifiable encouragement was given to further trials.

The importance of the subject warrants the report in detail of the cases, which we shall give as minutely as we are able, and, having done this, we shall discuss as far as possible the most important aspects of the question.

The first two cases, on account of the imperfect reports, but with the diagnosis confirmed by the autopsy, only show that the surgical evacuation of the contents of the cavities gave considerable relief to the patients, and in the second case this relief lasted so long that recovery was fully expected.

CASE I. *Large Abscess of the Lower Lobe of the Right Lung.—Incision in the mammary region—Washing out of the cavity—Immediate relief—Acute pleurisy on the opposite side—Death twenty-nine hours after the operation.* (Radek, 1878, *Centralblatt für Chirurgie*, No. 44, 1878, p. 750.)—A man, forty-four years of age, was brought into the hospital suffering from great dyspnœa. Examination showed two large fluctuating abscesses in the neighbourhood of the right nipple. Pressure over the abscess-cavities showed that they communicated with each other, and caused increased dyspnœa and cough, which brought up a quantity of pus. The diagnosis was supposed to be an empyema which was about to open through the walls of the chest, and had already broken into the lung.

An incision was made, through which about a quart of pus was evacuated. The cavity was washed out with carbolized water, and the patient experienced immediate relief. On the following day, however, twelve hours after the operation, the fever set in anew, and the physical examination showed that a pleurisy was commencing in the left lung. The patient died twenty-nine hours after the operation. The autopsy showed no empyema, but a very large abscess of the lower lobe of the right lung and a recent pleurisy on the left side.

This case came under treatment at so late a stage of the disease that it has no value as regards diagnosis and the method of operation. It shows, however, that the operation was followed by some relief, and did not in any way hasten the fatal termination, but was performed too late to prevent it.

CASE II. *Large Abscess in Lower Lobe of Left Lung.—Fetid expectoration—Insufficient drainage through the bronchial tubes—Incision in sixth intercostal space—Drainage and washing out with carbolized water—Marked improvement for twenty-six days—Sudden and unexpected death on the thirty-first day—Cause of death not given.* (R. S. Sutton, Pittsburgh, Pa., 1879, *Chicago Medical Review*, March 5, 1881, p. 112.)—Early in 1879 I was called to see a Bavarian, aged thirty-four, who was much emaciated, but presented the appearance of having been a very powerful man. The patient had a hoarse voice and a rapid pulse, his temperature on further examination being found slightly above the normal. He had had, five years before, a violent attack of pneumonia, from which he had never entirely recovered, but, although for a time somewhat better than during the pneumonia, his general health had become much worse than it had been prior to the attack. Two years subsequent to the pneumonia he had three attacks of hæmoptysis, a year after which, symptoms of acute pleurisy made their appearance on the left side. At the present time the patient has much cough and a muco-purulent expectoration. On physical examination the right lung is apparently normal. There is a total absence of vesicular respiration on the left side, gurgling, increased on coughing, being present at the same time; there is complete dulness on percussion while the patient remains sitting. On the patient's assuming a recumbent posture, succussion showed a decided metallic tinkling. The recumbent position provoked cough, with increased expectoration, having a foul odour. The patient was informed that his case was one of doubtful prognosis, and thereupon left further procedure to the physician. The day following the examination just mentioned I visited the patient in company with Dr. Geo. Rohansen, fully prepared to operate. To determine the correctness of the diagnosis of the supposed cavity, the lung was aspirated, giving vent to quite a quantity of ill-odoured pus. A bistoury was plunged into the lung at the sixth intercostal space, giving vent to quite a quantity of foul, purulent material, which was ejected with some force when the patient coughed. Two large-sized Nélaton's catheters were passed into the cavity through the opening and secured by adhesive plaster, at the margins of the wound; carbolized distilled water at a temperature of 100° F. was projected, by means of a Davidson's syringe, through one of the catheters, passing out through the other. The patient experienced the odour of carbolic acid at its first injection. The cavity was washed out daily for a month, the patient being well fed. He was able to be up and about for twenty-six days, aad was apparently on a fair road to recovery, when he died suddenly on the thirty-first day. At the autopsy an abscess was found involving the entire lower lobe of the left lung. The pleura pneumonalis and costalis were glued together. An enlarged bronchial tube led from the abscess to the trachea.

This case, although so superficially reported that it does not furnish any tangible points for the differential diagnosis between empyema and pulmonary abscess, has considerably more interest than Radek's case, because it shows—the diagnosis being confirmed by the autopsy—that a large pulmonary abscess was opened, drained, and washed out, with

unmistakable relief, and that the effects were so beneficial that the patient seemed, for thirty days, to be in a fair way to recover. The autopsy, valuable as to the confirmation of the diagnosis of pulmonary abscess, failed to demonstrate the cause of the patient's death, and consequently the importance of the case is limited to the immediate consequences of the operation.

The following cases have considerably more interest, partly because the diagnosis was carefully made before the operation, and partly because the main feature in the indications in all these cases was, by the operation, to evacuate fetid or gangrenous matter from pulmonary cavities having insufficient outlets through the bronchial tubes, and where consequently the remaining fetid matter produced symptoms of general poisoning by absorption, as fever, collapse, etc., as well as poisoning of the rest of the lungs, in the shape of diffuse fetid bronchitis. In all of these cases except one, the operation was followed by decided relief, temporary in two cases, and permanent in our own.

CASE III. *Multiple Fetid Abscesses in lower Lobe of Right Lung, subsequent to Bronchitis and Pleuro-pneumonia.—Hectic diarrhœa—Insufficient outlet through the bronchi—Incision in eighth intercostal space, mid-scapular line—Drainage and washing out with Condy's fluid—Temporary cessation of cough and fetor for three weeks—Insufficient drainage—Return of fetor—Pleuro-pneumonia on the opposite side—Death fifty days after the operation.* (W. Douglas Powell and R. W. Lyall, London, England, 1879; *Lancet*, vol. ii. No. 1, 1880, p. 12.)—A man, forty-nine years of age, had bronchitis in December, 1878, and in February, 1879, a pleuro-pneumonia and fetid expectoration. He improved for a time, but then suffered a relapse. In July, 1879, he entered Middlesex Hospital. On admission there was consolidation of the lower lobe of the right lung, with excavation of its central portion, the cavity signs being located at about the level of the spine of the seventh dorsal vertebra, and in line with the angle of the scapula. There were considerable hectic, diarrhœa, and anorexia. The breath and expectoration were extremely fetid, the latter being muco-purulent in character and very abundant, amounting to about one pint in twenty-four hours.

The area of excavation having been carefully marked out, the operation was performed September 11th. A medium-sized trocar was first passed in at the eighth intercostal space, mid-scapular line, and, a free incision having been made through the tissues down to the intercostal muscles, the fine trocar was withdrawn and a full-sized hydrocele trocar inserted to enlarge the opening, through which the drainage-tube was afterwards inserted. Carbolized dressings were then applied. A moderate quantity of fetid pus escaped from the wound, and subsequently a free but never abundant discharge from the drainage-tube.

The expectoration and cough almost entirely ceased. The wound was dressed daily under the carbolic spray, and injections of Condy's permanganate of potash solution were used. October 2d. There was some return of the fetor of breath, the discharge from the tube having always been somewhat fetid. Some trouble was occasioned by the drainage-tube getting out, its re-introduction being rendered more difficult by encroaching granulations, and the tube was felt to strike against some impediment deep in the lung. The channel was kept dilated, however, and the patient improved in strength, and on October 20th, was transferred to Brompton Hospital. The fetid sputa returned toward the end of the month, however; the amount expectorated also continued to be very scanty. The patient lost ground rapidly, and was finally attacked by pleuro-pneumonia on the opposite side, from which he died October 31st, fifty days after the operation.

The autopsy demonstrated several inter-communicating cavities in the lower lobe of the right lung. This lobe was firmly adherent throughout, and a drainage-

tube passing through the eighth intercostal space entered the contracted cavity, which was connected with the main cavity by a short, dilated bronchus. It was evident that, in contracting upon the tube, the wall of the cavity partially occluded its extremity. The remainder of the lobe was consolidated by fibroid interstitial pneumonia, surrounding bronchiectatic cavities. There was broncho-pneumonia with effusion on the left side. The rest of the lung was emphysematous.

Besides the very remarkable relief derived from the operation, this case is mainly interesting because it shows that the insufficient drainage and evacuation was evidently the reason why the latter failed to save the patient's life. And it was here, as in Radek's case, the poisoning of the other lung from the decomposed contents of the cavity which, resulting in a pleuro-pneumonia, caused the patient's death. In short, we may say that the patient died notwithstanding the operation, on account of the perhaps inevitable insufficiency of the operation, but by no means from any reason for which the operation itself could be held accountable.

A similar condition probably existed in Williams's case, which is mentioned only very briefly, too briefly to allow either deductions or criticisms, but which, for the sake of completeness, we shall mention.

CASE IV. (Williams, London, England, 1879, *Lancet*, vol. ii. No. 1, 1880, p. 12.)—Dr. Williams briefly mentions that in one case he passed an aspirator needle into a bronchiectatic cavity without result. On a second tapping, however, he succeeded in evacuating the contents of a limited empyema, which, he thinks, may have been caused by the previous paracentesis.

It is easily seen that in Williams's case it is difficult to determine whether the entire want of success of the operation was due to avoidable inefficiency in the method of operating or to the unavoidable surgical intractability of bronchiectatic cavities in general. Such cavities, on account of their well-known irregularly sacculated and often ramified shape, present very great, if not insurmountable difficulties for effective surgical interference.

The following case is very interesting, because it presents, notwithstanding the want of an autopsy, a clear case of acute pulmonary gangrene subsequent to a croupous pneumonia. The description of the case, as well from the etiology as from the careful description of the development and physical signs, leaves no doubt as to the correctness of the diagnosis. It is probably the first, if not the only case of pulmonary gangrene treated by surgical operation, which, as far as temporary relief is concerned, may be accounted a success.

CASE V. *Gangrenous Cavity in Middle Lobe of Right Lung subsequent to Croupous Pneumonia.—Insufficient outlet through the bronchi—Adynamic condition of patient—Incision in the region of the angle of the scapula—Drainage with injections of carbolized water—Decided improvement for a week—Cessation of fetor of breath and expectoration—Return of fetid expectorativn—Collapse and death twelve days after the operation.* (Solomon Charles Smith, Halifax, England, 1879, *Lancet*, vol. ii. No. 3, 1880, p. 86.)—The patient, a man about sixty years of age, had always been in good health, until two months previous to the operation, during which time he had had a little shortness of breath on going up hill. Two weeks previous to the operation he had a sudden attack of pneumonia of the right side, with chills, pain in the right side, pneumonic crepi-

tus and rusty sputum. The case was not very severe, the temperature never exceeding 102°, and in about a week he got up. Two days later, the cough became worse, he felt weak, had to go to bed, and his breath had an offensive odour.

October 13, he suddenly expectorated half a pint of fetid gray fluid, and sank rapidly into a condition of collapse. On the next day, the patient was covered with clammy perspiration, his respiration was rapid and difficult, with loud tracheal râles; pulse 130, very feeble; could not lie down on account of the cough. The air of the whole room was extremely offensive on account of the gangrenous odour of breath and expectoration. The matter expectorated was principally a thick, tenacious, muco-purulent mass, but frequently alternating with this, was a thin, gray, offensive fluid, which seemed to gush into his throat suddenly, in such quantity that he would spit out mouthful after mouthful of about half an ounce each, for three or four times in succession. The right side was slightly less resonant than the left, especially at the base, and at and under the right nipple. There was less respiratory sound on the right side and less local vibration, but all the sounds were greatly masked by tracheal râles; he had no pain; the tongue was brownish-black and dry, and the patient was very weak. Under invigorating and stimulating treatment he seemed to improve a little for a day or two, but then the expectoration diminished and he became worse. Four days later, a quantity of the same fetid fluid as before was expectorated, and he felt a little relieved, but soon afterward the expectoration stopped again and the adynamic condition of the patient increased.

On October 20, distinct cavernous respiration was heard below the spine of the right scapula, and external to and below the right nipple. The diagnsois was now made of a large cavity extending chiefly through the middle lobe of the right lung, with no efficient outlet for the contained fetid matter, and a consequent adynamic condition of the patient from poisoning by the fetid pus. It was now resolved to operate, with a view toward procuring an outlet for the fetid matter, for the following reasons:—

I. That the actual condition of the patient made it certain that he would die, and that very speedily.

II. That there would be some chance for his life if the cavity could be found and an opening made.

III. That it would be justifiable to explore with an aspirator, and if the cavity was found, to enlarge the opening and put in a drainage-tube.

At a point near the angle of the scapula, an aspirator-needle was inserted for three or four inches. No fluid escaped, but very fetid air was drawn through the tube. On holding a candle near the canula, the flame was blown to and fro during respiration, so that evidently a cavity had been reached.

Using the canula as a director, a knife was inserted between the ribs, and by the side of the knife dressing forceps were slipped in and the wound enlarged sufficiently to allow the introduction of a small india-rubber tube. Through the latter, a little carbolic acid solution was injected. This seemed to occasion a fit of coughing, when about half a pint of fetid pus, of the same character as the former offensive expectoration, was forcibly expectorated. The tube was left in the wound, which was covered by a large pad of a dozen folds of coarse muslin, wrung out of a solution of carbolic acid. This dressing was ordered to be changed every three hours.

For the first week after the operation, the improvement was very decided. For six days, the expectoration was very much diminished. The fetor also became much less, except at the time when the dressing was changed. He enjoyed his food more, and was altogether more comfortable. The respiration became much clearer in the left lung and the unaffected parts of the right lung, the moist sounds being much less frequent, and the tracheal râles only occasional. The discharge from the wound, however, continued extremely offensive, notwithstanding the daily irrigation of the cavity by a siphon. Whenever the dressing was changed, it was found to be soaked with a discharge for an area of five to six inches in diameter. As the water which escaped on washing out the cavity was only slightly stained, the offensiveness was attributed not to any retention of pus, but rather to sloughing within the lung.

Eight days after the operation the discharge had lessened a good deal, but the

expectoration now increased and again became offensive. The pulse increased to 112; temperature, 100°. On the next day he was better, in the morning, had less cough and expectoration, and took food well. But the wound was beginning to slough, and a few gangrenous black shreds were discharged through the drainage-tube. In the afternoon he became very ill, with laboured breathing, quick pulse, and profuse cold sweats. From this time he gradually became weaker, would take no more food, and died November 2, apparently from simple asthenia. An autopsy was not held.

Isolated as this case stands as an effort to evacuate the contents of an indisputably gangrenous lung cavity, it may be hazardous to venture any justifiable criticism upon the operation in the case in question, from which to deduce any conclusions showing that in such a case the patient's life might have been saved. But it is barely possible that, if an opening had also been made in the anterior wall of the cavity when the cavernous breathing presented itself round the nipple, that then more efficient and perhaps sufficient drainage, and an outlet for all the gangrenous matter, fluid as well as solid, might have been effected.

That a double, free, and extensive opening of similar pulmonary cavities, with thoroughly effective drainage, by no means involves any additional danger, but rather, when practicable, is liable to make it possible to save the patient's life, we claim to show by the following case.

CASE VI. *Large Fetid Abscess Cavity in Middle Lobe of Right Lung, caused by Suppuration around a Large Echinococcus Cyst, of twelve years' standing.—Fetor of breath and expectoration—Insufficient outlet through the bronchi—Diffuse purulent bronchitis in the rest of the right lung—Fever, emaciation, and collapse—Exploratory aspiration—Incision in third intercostal space on anterior surface, two inches to right of sternum—Digital exploration of the cavity—Counter opening in fifth intercostal space, anterior axillary line—Removal of the sac of the echinococcus cyst through the anterior opening—Drainage, by means of a large rubber tube—Washing out of the cavity with carbolic acid solution—Antiseptic dressing—Definite cessation of fetor of breath and expectoration—Wound closed in six weeks—In the seventh week, broncho-pneumonia of right lung, with diffuse purulent bronchitis of this and of the lower lobe of left lung, lasting four weeks—Perfect recovery.* (Christian Fenger, Chicago, 1880. *Chicago Medical Review*, vol. iii. No. 3, 1881, p. 57).—Francesco Coputo, Italian, a labourer, 34 years of age, was admitted to Cook County Hospital and placed under Dr. Hollister's care.

Previous History.—Father died at the age of 77; mother still living. He has one brother and one sister, who are in good health. He had always had good health until twelve years ago, at which time he was a mounted gendarme in Italy, and on duty from three to four hours consecutively. He had at this time a hemorrhage from the lungs of about two ounces, in consequence of which he was obliged to remain in the hospital a week. For the following two years he was well. After this time, he had a cough accompanied by pain around the right nipple. The pain subsided on the application of leeches; the cough also disappeared entirely after a month. In the following years he had every autumn a return of the pain, always at the same point in the chest, between the third and fifth ribs, and around the nipple, accompanied by cough. This would

persist for about a month, be relieved by the use of leeches and venesection, and disappear entirely. During the last four years, however, the pain became more severe, as did also the accompanying cough. In the intervals between the attacks, he would occasionally feel some pain in the region of the right nipple, when lifting a heavy weight on the right shoulder.

He came to New York in 1878, where he stayed a year and a half. He was able to work all this time, except during the usual attacks of the pain and cough in the fall, during which he expectorated mucous matter, which occasionally was slightly streaked with blood. In June, 1880, he came to Chicago and commenced work as a common labourer. In September the pain in the left nipple set in again. It was a steady, unvarying, intense pain, accompanied by only a slight cough. His appetite remained good, and he did not go to bed, but was forced to cease work for two weeks. During October he was at work again. In November, he was obliged to stop work on account of a return of the pain and cough. He lost his appetite, became weak, was confined to his bed about half the time, and finally, three weeks before he entered the hospital, he was obliged to remain in bed all the time. During this time he had no appetite, was feverish, would cough up about a pint of mucous matter, sometimes streaked with blood, in twenty-four hours, and was distressed night and day by the cough, which he could subdue only by lying prone in bed. A cataplasm was applied to the chest, and some medicine given. Suddenly, about a week before his admission to the hospital, he coughed up a large quantity of whitish matter, as he says, "white like paper." This was not followed by relief of the pain or cough, which rather increased. He grew more and more weak, could not eat, was not able to sleep on account of the cough and pain, and was told by those about him that his breath was offensive, he himself not being able to detect this.

On Admission.—The patient was in a profuse perspiration; pulse 98; temperature 104°; respiration 36; tongue slightly coated. When he lies on the back, and the chest is percussed, he coughs incessantly, and a very offensive odour is noticed around the bed. When he lies prone on the right side, the cough ceases, and the offensive odour is not so marked.

Examination.—The patient is poorly nourished, tall, and of moderate weight.

Percussion.—When the patient is sitting up in bed, percussion on the right side, over the supra-clavicular and infra-clavicular regions is normal, but from the second rib, in the mammary and infra-mammary regions, the percussion is dull. There is also dull percussion in the axillary and infra-axillary regions, and over the scapular and inter-scapular regions. In the infra-scapular region, percussion is normal. When the patient lies on the back, there is an area of tympanitic percussion sound on the anterior side of the body, namely, in the mammary region.

Inspection.—Both sides of the chest participate equally in the respiratory movements. The right side of the chest is neither sunken nor prominent. The intercostal spaces have the same appearance on the right as on the left side.

Palpation.—In the region of the dull percussion, the pectoral fremitus is nearly but not quite absent.

Auscultation.—Over the right side of the chest. Sibilant râles in the upper lobe in the region of the clear percussion, and in the posterior part of the lower lobe. Over the regions of dull percussion, the respiratory

sounds are obscure. When the patient lies down, auscultation over the tympanitic territories gives cavernous respiratory sounds.

A hypodermic needle was introduced near the right nipple by Dr. W. P. Verity, House Physician, while the patient was sitting up, and some fluid withdrawn, which was thin, grayish, and had the same offensive odour as the breath. On microscopical examination, this fluid was found to contain a large number of pus cells, with fatty detritus and bacteria.

Diagnosis.—Fetid cavity in the middle lobe of the right lung, nearer to the anterior surface, and most superficial at the nipple, having an insufficient outlet through a large bronchial tube in the anterior border of the cavity. Diffuse purulent bronchitis in the rest of the lung.

Five grains of quinia, every four hours, and whiskey sling were ordered.

December 22. The patient feels a little easier. When he is lying on the breast no offensive odour is perceptible. When he turns on the back, however, the breath becomes offensive, with an odour like rotten eggs, and cough sets in. In the morning the pulse was 84; temperature, 99°; respiration 32. Evening, pulse 90; temperature 102°; respiration 32.

For the next four days the patient remained in the same condition, having exacerbations of the fever at night, and lying prone on the right side in order to avoid the cough and offensive breathing.

26*th.* With the kind permission of Dr. Hollister, under whose care the patient was lying in the hospital, Dr. Fenger saw the patient and resolved to open and wash out the cavity. The reason for the operation was the following:—

As the large cavity in the anterior part of the lung had no sufficient outlet through the bronchial tubes, by which to evacuate its offensive contents, the poisonous character of which was indicated by the nightly exacerbations of fever and decrease in strength of the patient, it was deemed advisable to attempt to facilitate the evacuation.

Operation.—In the presence of Dr. Hollister, and assisted by the internes of the hospital, Dr. W. P. Verity, House Physician, and Drs. Gudden, McArthur, Bradley, Meacher, Kendall, and Bacon, Dr. Fenger operated in the following manner: The patient was anæsthetized with ether. An incision was made, two and one-half inches in length, in the third intercostal space, parallel with the ribs, commencing one and one-half inches to the right of the sternum, and one and one-half inches above the nipple. The tissues were divided until the intercostal muscles were laid bare. A detached hypodermic needle was introduced, and as neither inspiration nor expiration caused this to move, it was withdrawn, and the incision continued into the cavity. When this was opened, about half a pint of grayish-white offensive matter, intermixed with some air, escaped. The opening was then dilated sufficiently to allow the introduction of a finger into the cavity. By means of the finger soft, elastic lung tissue was felt below the opening; above, the roof of the cavity could not be reached; soft, elastic lung tissue could also be felt on the interior wall of the cavity, towards the mediastinum, and in the posterior wall of the cavity. In this latter locality the soft, elastic lung tissue decreased in thickness toward the anterior boundary of the axillary region, anterior to which the wall of the cavity was firm to the touch. At this point, namely, between the fifth and sixth ribs, close to the border of the pectoralis major, one and one-half inches to the right of and one and one-half inches above the right nipple, a counter-opening was made in the following manner: A urethral sound

was passed in at the original opening, and cut down upon at the above-mentioned locality.

A heavy rubber draining-tube, ten millimetres in diameter, with large lateral openings, was now introduced at the anterior and brought out at the posterior opening. By means of an irrigator, a two and one-half per cent. solution of carbolic acid was injected through the drainage-tube into the cavity, which was washed out in this way. As soon as this solution filled up the cavity, the patient began to cough. Each paroxysm of coughing forced out from the anterior opening, at the side of the drainage-tube, a jet of fluid, which was thrown from eight to ten feet out into the room.

During these attacks of coughing it was noticed that a yellowish-white, coherent mass would appear at and protrude a little from the anterior opening, but would slip back and disappear as soon as the cough ceased. Dr. Fenger attempted to seize this with the forceps and draw it out, but it would break asunder and slip back. With a view to its removal, he now dilated the anterior opening a little, introduced a finger and the forceps, and watched for another attack of coughing, which enabled him to get hold of and draw it out as one large, gelatinous, coherent mass.

On microscopical examination of the gelatinous mass removed from the abscess cavity during the operation, it was found to be a large echinococcus cyst, the wall presenting the characteristic, finely striped, that is, laminated layers of amorphous or homogeneous substance, the stripes always running parallel to the surface of the wall of the cyst. The sac, as we here present it to the Society, will be seen to be nearly round, and between five and six inches in diameter. The wall was homogeneous, gelatinous, and transparent; soft and friable, but still somewhat elastic, and presented no secondary cysts, either attached to the wall or free in the cavity.

The cavity was now washed out with the carbolic acid solution until the escaping fluid was perfectly clear. The incision wounds were reduced in size by means of sutures, both ends of the drainage-tube were secured by large asepticized safety-pins, and cut off close to the skin, and the wounds dressed antiseptically, as follows:—

A piece of protective was placed over each wound, and a pad, two inches thick, consisting of antiseptic gauze, not in layers but in a wad, applied so as to cover the entire anterior, lateral, and posterior wall of the right side of the chest. The wad was kept in place by a layer of gauze, and covered with a thick layer of salicylated cotton, over which was placed a large piece of mackintosh. The whole of the dressing was held in place by a piece of cotton cloth, and fixed with roller bandages.

The patient was taken to his bed, and quinia, morphia, and whiskey given.

Dec. 27. Pulse 88; temp. 98°; the patient's breath has no offensive odour; he can lie on his back without coughing; has slept well; has coughed only a little; no bad odour to the sputum. The wound was dressed; the dressings contained a little bloody pus; the cavity was washed out with one per cent. solution of carbolic acid, which made him cough, and forced a jet of fluid from the anterior opening through and beside the tube; the carbolic acid solution passed up into the mouth so that the patient could taste it.

28*th*. Pulse 80; temp. 98.5°. Less pus in the dressings. There is no noticeable offensive odour.

29*th*. Pulse 90; temp. 98.5°. The patient begins to have an appetite, sleeps well, and has very little cough.

The dressings were removed every day. The solution with which the cavity was washed out contained less and less pus.

Jan. 9, 1881. Pulse 108; temp. 98.5°. The water with which the cavity is washed out still has a whitish colour.

17*th.* When water is injected into the cavity, he coughs up part of it, and can taste and smell the carbolic acid.

21*st.* About two ounces of pus found in the discharge. If the patient coughs while an injection is being made, the fluid is ejected with great force through both ends of the drainage tube, from three to six feet in the air. As the cavity was evidently decreasing considerably in size, the axillary portion of the drainage-tube was removed in this way; the whole tube was taken out, cut in halves, and only one-half re-inserted through the anterior opening.

28*th.* No discharge in the dressings. The opening in the axillary region appears to have closed. The anterior opening is closing up fast around the drainage tube. Discontinued the injections into the cavity because it is quite small, and any injection causes great irritation of the bronchi, resulting in paroxysms of coughing. The patient eats well, sleeps well, and his bowels are regular.

Feb. 3. The anterior wound is still open, but the opening is very small.

6*th.* Both wounds are closed. The patient has no cough; appetite good; sleeps well, and is out of bed.

9*th.* The patient caught cold while walking around the corridor yesterday. Has fever, headache, and cough, which caused him to go to bed. Pulse 92; temp. 101.5°. He has no pain in the chest. He has a cough, which is so distressing that it disturbs his sleep. Numerous moist râles are heard all over the right lung and in the lower lobe of the left lung. Ordered quinia, morphia, and the inhalation of carbolic acid spray.

14*th.* Pulse 96; temp. 99.5°. He coughs a good deal and expectorates about a pint of muco-purulent sputum in the twenty-four hours. His appetite is fairly good. Microscopical examination of the sputum shows pus-cells and epithelial cells in a more or less advanced state of fatty degeneration. No elastic lung fibres found. The sputum has no fetid odour. Ordered a respirator, to the anterior side of which is attached a sponge soaked in five per cent. solution of carbolic acid, to be used four or five hours a day.

17*th.* Pulse 102; temp. 99°. Says that the inhalation of the carbolic acid solution makes him vomit.

21*st.* The sputum is still abundant, and moist râles are heard over both lungs.

27*th.* Pulse 84; temp. 98.5°.

Physical Examination, Right Lung.—Over the right clavicular and supra-clavicular fossæ, there is dull percussion, and numerous fine crepitant râles are heard, both with inspiration and expiration. In the infra-clavicular, mammary, and infra-mammary regions, the percussion is normal, crepitant râles spread here and there, accompanying the otherwise normal respiratory sounds. In the supra-spinatus and infra-spinatus regions, the percussion sound is not exactly dull, but less sonorous than on the left side. In the infra-scapular region, percussion is normal. A few spread moist râles are heard all over the posterior surface of the lung. The respiratory sounds are otherwise normal.

Left Lung.—The anterior surface is in every respect normal. On the posterior surface, the upper half of the lung is normal, but in the infra-

scapular region, numerous fine crepitant râles are heard, both with expiration and inspiration.

Ordered Griffith's mixture, syrup of morphia, and cod-liver oil, and the continuance of the inhalation of carbolic acid spray from the sponge and by the atomizer. The patient expectorates in twenty-four hours about half a pint of colourless matter, consisting of semi-transparent slimy matter, intermixed with yellow lumps.

March 4. Pulse 72; temp. 98.5°. The dulness in the upper lobe of the right lung is subsiding, so that now the inner half of the right clavicular region gives clear percussion. There is still dull percussion, however, over the outer half of the right clavicular and supra-clavicular regions. The crepitant râles have diminished considerably over the apex of this lung, and have disappeared in the rest of the lung, except at a point corresponding to the lower half of the former cavity; namely, a place in the anterior axillary line between the fourth and fifth ribs, to an extent of one to two square inches.

7th. Very little cough, and this brings up only slimy sputum, not to exceed one to two drachms in the course of twenty-four hours.

15th. Percussion is perfectly normal throughout both the right and left lung. Respiratory sounds are normal, movements of both sides of the chest normal. No atrophy or sinking-in over any part of the right lung. The patient has a very slight cough, with a little grayish-black mucous expectoration, probably from the pharynx or nasal cavity, the colour of the sputum being due to its admixture with dust. No râles in any place in the right lung. He sometimes feels slight pain in the above-described limited space in the right infra-axillary region. Pulse and temperature are normal. Appetite good. He has regained his strength, and looks well nourished and healthy.

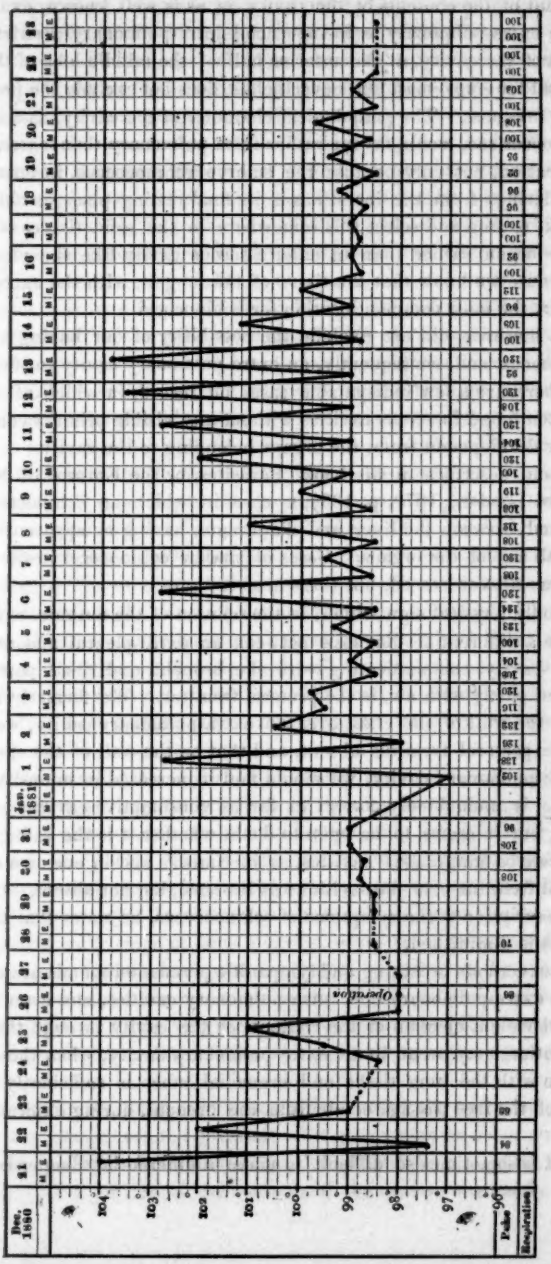
April 7th. The patient was discharged from the hospital, cured.

On the opposite page is a diagram showing the temperature curve of this case.

The first and main question that presents itself in this case is naturally this: Was the disease an ichorous cavity within the lung tissue, or was it a limited pyo-pneumothorax? As the patient did not die, and, as consequently we have no final proof, we must base the diagnosis upon the symptoms as given in the description of the case.

The symptoms, and the whole course of the disease were so exactly congruent with the description and course of echinococcus of the lung as given in *Ziemssen's Encyclopædia* (Parasites of the Lungs, vol. v, p. 462), that the diagnosis might have been made with a very great degree of probability, even before the evacuation and microscopical examination of the cyst. The pulmonary hemorrhage, pain in the affected lung, recurrent attacks of cough, that is, bronchitis, persistent pain, always at the same place, and increased by bodily exertion, all these symptoms increasing slowly during a long series of years, and, finally, the death of the echinococcus and suppuration in and around the sac, form, taken together, the typical course of a large pulmonary echinococcus. But we know that in very rare cases an echinococcus may develop within the pleural cavity.

The alternating dull and tympanitic percussion, according to the dis-


Operation
Pulse
Respiration

placement of the contents of the cavity, is, as is well known, exactly the same in extra-pulmonary as in superficial intra-pulmonary cavities. The position of the cavity, at the anterior half of the middle lobe of the lung, is unusual for empyemas, but, nevertheless, does not exclude the possibility of their presence. The pathological character of the cavity, as a separate echinococcus sac, would favour rather intra-pulmonary than extra-pulmonary location, not only because the embryo echinococcus, in terminating its wanderings from the intestines to its final resting place, is obliged, so to speak, to stop and select this somewhere in the solid tissues of one or another organ, rather than to enter a serous cavity like the pleura, but also because we know that the tissue of the lung is, with the exception of the liver, the most common location for echinococci.

This, however, did not exclude the possibility of our having a pleural echinococcus, and, consequently, an extra-pulmonary cavity to deal with, since there are a few indisputable cases on record, in which echinococci have been found in serous cavities without any visible primary connection with, or development from, the organs belonging to the cavity.

Cobbold describes in his book (Parasites, or the Entozoa of Men and Animals, London, 1879, p. 133), a case in which an echinococcus sac was found between the liver and diaphragm, having no apparent connection with any of the organs. Cases of similar echinococci in the pleural cavity are also on record, but these are very rare.

The only physical sign which, in the opinion of the authors, enables us to make a differential diagnosis between an extra-pleural and an intra-pleural cavity, communicating with the bronchi, and filled partly with fluid and partly with air, is the pectoral fremitus. We formerly believed that on the wall of the chest over an extra-pulmonary cavity, we should find the pectoral fremitus absent, and that on the wall of the chest over an intra-pulmonary cavity, we should find it increased in intensity. This doctrine is undoubtedly correct as far as consumptive cavities are concerned, but it seems to be open to doubt whether it is the same in cases of abscess or gangrenous cavities, as in Smith's and in our own case the pectoral fremitus over the cavities was lessened, but not absent. In Simpson's description of the symptoms of echinococcus, he states that the vocal fremitus is diminished.

The cavernous breathing and tympanitic percussion sounds are common to both extra-pulmonary and intra-pulmonary cavities, and even the sudden and violent ejection of the contents of the cavity through the wound of operation, may occur in an extra-pulmonary cavity, when the communication with the lung tissue and bronchial tubes is sufficiently large to admit of the free passage of air from the bronchi, during expiration and cough.

As it is sometimes so difficult to make a differential diagnosis by the

physical signs alone, this task may be rendered more easy by taking into consideration the whole development and course of the disease.

In a case like Smith's, for instance, where subsequent to an attack of croupous pneumonia, the resolution of the peripheral area of which has taken place, and then gangrene set in, in a part of the lung over which the percussion is clear, and in which the breathing has gradually become cavernous, the diagnosis presents, of course, no peculiar difficulties. In other cases, as our own, for example, the differential diagnosis may be difficult, if not impossible up to the time of the operation, during which it is possible that the examination of the cavity with the finger, that is, the palpation of its walls, may enable us to ascertain the nature of the cavity, In our own case, any doubt which might have existed as to the intra-pulmonary character of the cavity was dispelled by the examination with the finger, which showed that soft lung tissue formed the lower, inner, and outer wall of the cavity. If the echinococcus had been developed in the anterior part of the pleural cavity, it would have pushed the anterior border of the lung, together with the lung itself, backward, and no lung tissue would have been found on the interior wall of the cavity.

A number of very important questions naturally present themselves whenever a new and somewhat radical treatment is entered upon in a class of diseases which have not been hitherto treated by direct surgical interference. The number of these questions still to be answered is so much the larger, as the cases, as yet on record, are comparatively few.

We shall endeavour to enumerate these questions, and point out the direction in which future investigations will have to be made, with a view of bringing them nearer to a solution. We shall therefore consider fully the following three points: The indications for the operation, the operation itself, and the after-treatment.

I. *Indications for the Operation.*—What cases of acute pulmonary cavities require or may be benefited by opening and drainage? In examining this question, we must consider not only the possibility of, but also the frequency with which acute cavities of the lungs, abscesses of course, rather than gangrenous cavities, have been known to terminate in spontaneous recovery. It will consequently never be advisable to operate at a very early stage of such a cavity, when the general condition of the patient may lead us to expect a spontaneous recovery by evacuation through the bronchi. On the other hand, to wait until the patient has been brought down to the very limits of vital power would be to press the expectant treatment too far. In Radek's case, the operation was evidently performed too late.

On reviewing the other cases on record, we think the operation is justifiable in any case where the presence of a gangrenous or ichorous cavity having been ascertained, it is found that, notwithstanding an outlet through the bronchi for a portion of the contents of the cavity, it steadily fills up

again; the partial evacuation does not relieve the patient, who gradually loses strength, and progresses toward a condition of collapse; a steady or intermittent rise in temperature continues; the infection of the healthy portions of the lung from the decomposed contents of the cavity has commenced, or is evidently about to take place; the breath and expectoration continue fetid; absence of appetite; increasing weakness, with or even without fever, etc. These indications will enable any medical man of some clinical experience to determine, in the majority of such cases, when the disease has reached a point from which spontaneous recovery is impossible.

Is the cavity so situated that we can get at it from the outside, and is the pleural cavity covering it obliterated by adhesions, so that we do not run any risk of causing a fetid pyo-pneumothorax by opening into the cavity and allowing decomposed matter to enter the pleural cavity? In answer to the first part of this question, we may say that any cavity covered by the scapula, or situated within the supra-clavicular and infra-clavicular regions may at present be regarded as inaccessible. But from the mammary and axillary regions downward, as well as in the infra-scapular region, the anatomical conditions of the wall of the chest do not prevent access to the cavity. Regarding the second part of the question, namely, the obliteration of the pleural cavity covering the field of operation: Such adhesions are to be expected in cases in which the superficial area of the cavity is large, or more frequently, in which several attacks of the disease have occurred in that portion of the lung where the cavity forms, constituting in all probability the primary cause of the gangrene or suppuration, both of which, as is well known, do not set in primarily, but are consecutive or secondary to a number of different primary pathological conditions of the lung tissue.

In many cases it will be impossible to ascertain whether or not these adhesions exist, and to be sure on this point, we shall recommend the procedure employed in our own case. Make an incision down to the intercostal muscles, pass a needle into the lung, and watch the needle during the phases of respiration. If it does not move synchronously with the respirations, we may be sure that at this place there are adhesions between the layers of the pleura, and may consequently cut in without fear. If the needle does move, we can abandon the operation if we choose, since the small primary incision, as well as the puncture with the needle or plastic pin, if covered by antiseptic dressing, will do the patient no harm.

A question yet to be determined is, whether the operation had better be abandoned when the needle moves and the pleural cavity is consequently known to exist. Smith makes a remark in regard to this point, with which we might theoretically feel inclined to agree; that the tapping of a progressive gangrenous cavity through a pleural cavity not yet obliterated, would appear only to hasten by a little what would inevitably soon occur of

itself, namely, the formation of a fetid pyo-pneumothorax. There is, however, the compensatory advantage that the incision which caused this empyema, is the most essential for its relief.

This is an open question, however, and the ground is very dangerous, as we know that such openings of still healthy pleural cavities have caused rather sudden and possibly inevitably fatal results.

As a last point in the indications for the operation, or rather as a preparatory measure, before the operation is resorted to, we should recommend that one or two exploratory aspirations be made with a hypodermic syringe, in the place in which the physical signs may lead us to locate the cavity about to be operated upon. This exploratory aspiration, when fetid matter is brought out from the cavity, not only furnishes us an unmistakable proof of the correctness of the diagnosis of a cavity filled with fetid matter, a mistake in the diagnosis of which would prove a very disagreeable surprise during the progress of the operation, but it may also give us some idea as to the situation of the cavity beneath the surface.

II. *The Operation.*—The operation having been decided upon, the first question is: Where shall the opening through the wall of the chest be made? or rather: At what point shall we cut in? In cases in which the cavernous symptoms are limited to a single small spot of the thorax, the place of incision shows itself easily enough, as the choice of necessity. But cases may occur, like Smith's, for instance, where the cavity comes to the surface at different or distant places. It has been suggested that in such cases, the general rules for the opening of abscesses should be followed out, namely, that the lowest point, the point nearest to the bottom of the cavity, should be selected as the place most favourable for the escape of its contents through the drainage tubes.

As the local and general condition of the patient to be operated upon will not enable him to be out of bed, and as the recumbent position will consequently be necessary, it would seem desirable to select a place for the incision as near the posterior and inferior surface of the cavity as possible. The posterior wall of the thorax has, however, this disadvantage, that the intercostal spaces here are narrower than on the anterior wall of the thorax, and that, consequently, not only the introduction of a sufficiently large tube may be difficult, but the introduction of the finger for exploring the cavity may be entirely impossible, unless resection of a portion of one of the ribs is resorted to. That the latter procedure is not very dangerous in itself we know from operations for empyema, and in case of necessity we shall not hesitate to resort to it. But the excision of a piece of a rib may cause suppurative periostitis and necrosis, and should consequently be avoided when not absolutely necessary.

The most natural way of solving the problem of the place for opening pulmonary cavities seems to us to be the following: Be guided as far as possible by the common law for the opening and evacuation of abscesses

in any other part of the body, that is, make two openings; the first or primary opening in the most superficial and in other respects most easily accessible place to the cavity, then explore the cavity, and by this exploration try to ascertain the deepest point which will allow of a counter-opening being made in the most favourable and safe place, for, as nearly as possible, the complete evacuation of the contents of the cavity.

In our own case this plan proved eminently satisfactory, and the existence of two openings instead of one was not only not accompanied by the slightest disadvantage in any way, but, in our opinion, facilitated greatly the evacuation and cleansing of the cavity.

When there is only one opening into a cavity, the evacuation may be perfect; but thorough washing out, even through a double catheter or tube is, for reasons too obvious to mention, not as efficient as when two openings have been made.

Washing out through a single tube, as has been done in most of the previous cases, causes, from distension of the walls of the cavity and irritation of the bronchial tubes by the fluid injected, so much irritation and so violent a cough, that Mosler, Williams, and Lyell were obliged to abandon the injections as too irritating to the patient.

When these authors go a step farther, and say that injections into the cavity are not all necessary, because the symptoms are relieved and the fetor is stopped by the simple drainage of the cavity, we must say that the facts from the cases recorded do not quite corroborate this assertion, as neither in Smith's nor in Powell and Lyell's case was the fetid condition of the contents of the cavity entirely overcome by the operation alone.

Taking into consideration the fact that in all cases previous to our own, only one opening had been made, and only a single drainage-tube employed, it is very probable that to the drainage and cleansing of the cavity by means of the double opening in our own case, is to be attributed the instant and permanently perfect result as regards the disappearance of the fetor.

Having thus decided where to cut down upon the cavity, we make an incision, one to two inches in length, in the middle of the intercostal space, parallel to the ribs, down to the intercostal muscles or pleura, ligating any vessels met with. A somewhat free incision is liable to prevent general subcutaneous emphysema from setting in. This does not seem to be very dangerous, however, as in Williams's case, in which the air contained was fetid, no inflammation occurred and the emphysema disappeared.

The next point is how to make the opening through the pleura or rather the lung tissue which possibly forms the peripheral wall of the cavity. We must remember that the lung tissue of the wall of the cavity, which we have to cut through, may contain arterial or venous pulmonary branches, sufficient in size to cause a considerable and very undesirable

hemorrhage, which in this place, it might be difficult if not impossible to control. We therefore agree with Lyell and Smith that it is not desirable to make too free use of the knife here, or, as Sutton describes it, to "plunge" a knife into the cavity. A punctured opening should rather be made with a medium sized trocar, and this opening dilated by blunt instruments as, for instance, a dressing forceps, sufficient to admit either, as the above author states, a sufficiently large drainage tube, or rather, as we should not hesitate to propose in any case, to admit a finger for the exploration of the cavity.

The exploration of the cavity with the finger serves a double purpose: First, to find a suitable place, at the lowest possible part of the cavity, at which a counter-opening may be made safely, that is, without cutting through too much lung tissue or into the pleural cavity; and, second, to ascertain by touch, the presence of free sequestrated pieces of dead lung tissue, with a view to their removal. This latter is mainly of importance in gangrenous cavities. In circumscribed gangrene of the lungs, a piece of dead lung tissue of the size of a walnut may be found (Rokitansky, *Pathological Anatomy*, Sydenham Soc.'s Edition, vol. iv. p. 96). The removal of this is of course essential to the stoppage of the fetor and of the possible infection of the rest of the lung.

That such a piece of gangrenous lung tissue can be successfully removed, and the patient recover, has been demonstrated in a case of gangrenous pleurisy, reported by Wagner (*Berliner Klinische Wochenschrift*, Sept. 6, 1880, p. 511), in which by an opening through the empyema, a piece of gangrenous lung tissue, seven centimetres long and three centimetres broad, was removed, after which the fetor immediately stopped, and the patient finally recovered.

The next important point to consider is with what kind of drainage-tube the most efficient drainage of the cavity may be accomplished. Mosler used a silver tube. In all the other cases, rubber tubes have been used, but Lyell advocates the silver tube with a shield with which to strap it to the chest, in the same way as the canula for tracheotomy. In our opinion, metal, hard rubber, or any tubes of hard material are dangerous, because there will always be a possibility of hemorrhage into the cavity, caused by ulceration of a vessel in the wall of the cavity from rubbing against the hard tube.

That ulceration and fatal hemorrhage may take place in this way we know from cases of fatal hemorrhage caused by usura of vessels from rubbing against calcareous deposits, the so-called "lung stones," in small pulmonary bronchiectatic cavities, which were healing, but in which, for some reason, the irregularly shaped lung stones were not evacuated through the bronchi, but remained in the cavity. Consequently we prefer soft material, as flexible India-rubber, for drainage tubes for use in lung cavities.

In cases in which it is impossible to make more than one opening into

the pulmonary cavity, we recommend the use of a double, soft rubber, drainage-tube, which is easily made by cutting the necessary openings in the walls of the tube, and bending it in the middle, so that one hole shall be at the bottom of the tube when bent, and several openings on either side of the double tube. This may then be sewed together, and the tube is ready for insertion.

In the cases previously referred to, in which only one opening was made, a single tube was always used, and the drainage was insufficient, because the fetor was not permanently overcome, and the washing out was very irritating, for the reasons stated above.

When two openings can be made into the cavity, we advise that the method employed in our own case be followed out, namely, to introduce a large, soft rubber drainage-tube through one opening and lead it out at the other. To prevent these drainage tubes from slipping in or out of the cavity, we recommend the use of a disinfected safety pin passed through the peripheral ends of the tube. If thought necessary, this pin may be easily secured by straps around the chest, and the tube cut off just beyond the pin.

The washing out of the cavity can be effected without much irritation to the patient, by means of a double drainage tube when there is only one opening or of a single perforated tube when there are two openings, provided the fluid is not injected too vigorously.

The thorough washing out of the cavity is important as long as any fetor remains. With what solution this should be accomplished is an open question. Lyell used Condy's fluid; Smith, a solution of carbolic acid of unknown strength, and in our own case, we used for the first irrigation a two and one-half per cent. solution of carbolic acid; later, a weaker (about one per cent.) solution, and finally, when no fetor was perceptible, either in the discharge or breath, a solution of thymol of the usual strength was employed.

There is no doubt that the carbolic acid is the most efficient as a disinfectant, but there is always some danger of carbolic acid poisoning when we have to wash out a cavity under such conditions that we cannot be sure of removing the whole amount of the fluid injected. For this reason, we recommend the following plan for the washing out of fetid lung cavities: Commence to wash out with a two and one-half per cent. solution of carbolic acid; follow this either with a weaker solution or with thymol solution of the usual strength. Let this procedure be repeated at each successive washing out of the cavity until the fetor entirely disappears, and then use the innocent thymol solution as long as there is any considerable discharge from the cavity. When the discharge stops, discontinue the injections.

The dressing of the lung operated upon should consist of voluminous antiseptic dressings; namely, a wad, two to four inches thick, of Lister's

gauze, surrounded by a layer of salicylated cotton, one to two inches in thickness; the wad of gauze and cotton should cover the entire side of the chest; over this should be placed a large piece of mackintosh, and outside of this, a set of roller bandages should be applied, to keep the dressings in place.

III. *After-treatment.*—The dressings should be changed as often as may be necessary, according to the amount of the discharge. Smith had the dressings changed every three hours. In Lyell's and also in our own case, the dressings were changed every twenty-four hours. We do not recommend the removal and change of the dressings oftener than once in twenty-four hours, except when the discharge is so copious as to soak entirely through the bandage. Frequent changing of the dressings disturbs the patient, who needs rest.

The medical treatment is simply symptomatic; quinia, when there is a rise in temperature; morphia or opiates for the cough; wine and other alcoholic stimulants to keep up the strength, and nourishing food of any kind, as much as can be taken, are all indicated.

The drainage-tube should be removed when the cavity has filled up, and retracted so as not to retain any fluid in the edges, and when, consequently, the discharge has stopped.

It is important not to remove the drainage-tubes too early, because the external openings are liable to close up before the cavity is closed, as we know from Lyell's case, in which the re-introduction of a drainage-tube that had slipped out was made difficult by encroaching granulations in the canal leading to the cavity, and as we know from general experience from old empyemic fistulæ. In our own case, we think that the drainage-tube was removed too early, and that this mistake placed the patient's life in jeopardy. It will be seen from the history of our own case, that after the removal of the drainage-tube and the closing of the external wound, when we thought everything safe and all right, and the patient was allowed to be up and around, suddenly diffuse bronchitis and broncho-pneumonia set in in the whole upper lobe of the affected lung, and bronchitis in the lower lobe of the other lung. When this serious complication set in we were convinced that it originated from aspirated matter, from the not yet fully closed pulmonary cavity, notwithstanding the absence of any physical signs indicating such a condition of the cavity, and we watched the case from day to day, seriously contemplating the re-opening of the anterior wound and re-entrance to the cavity, if the general condition of the patient should not improve within a few days. The operation, however, did not take place, as the bronchitis and pneumonia subsided under general treatment, combined with inhalations of carbolic acid through a steam atomizer and sponge. Thereafter, recovery was uninterrupted and perfect.

The secondary bronchitis and broncho-pneumonia is undoubtedly the

main danger we have to encounter during the course and after-treatment of cavities in the lungs, whether surgical treatment has been resorted to or not. It was found to be the cause of death in Lyell's case; it jeopardized the recovery in our own case. In Smith's case no post-mortem examination was made, and in Sutton's and Williams's cases, the records are not sufficiently explicit to throw any light upon this subject.

But from the slight amount of material existing, it seems evident that this bronchitis and broncho-pneumonia is an essential complication of cavities in the lungs, distinguishing such cavities from fetid intra-pleural cavities and empyemas, and gives an interesting hint as to the importance of effective surgical treatment.

In conclusion, we shall say that the whole subject of the surgical treatment of intra-pulmonary cavities is so new, and the important questions as to all the details so many, that our paper of to-day cannot be considered as attempting to solve any of these questions definitely.

As to the practical value of the operation, the objection might be, and has lately been made, that the number of cases in which this treatment may be indicated is very small. From a scientific and even from a humanitarian point of view, this objection, it is needless to state, is entirely valueless.

That this new field of surgery deserves to be entered upon and have a fair trial is beyond question, not only from a practical point of view, as a temporary relief has been obtained in most of the cases on record, and a permanent cure in our own case, but also from a scientific point of view, as the procedure we have advocated is entirely rational, that is, in conformity with the physiological and pathological facts and laws governing the diseases in question.

We finally hope and trust that our case and our remarks may encourage other members of our profession to take the matter in hand and contribute to the solution of this problem, which even if only occasionally, certainly may save a human life, otherwise irrevocably lost.

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ARTICLE VI.

HYSTERO-EPILEPSY.

By CHARLES K. MILLS, M.D., Neurologist to the Philadelphia Hospital; Lecturer on Mental Diseases and Electro-Therapeutics in the University of Pennsylvania.

FRENCH authors distinguish two forms of hystero-epilepsy: (1) Hystero-epilepsy with separate crises, in which the symptoms of hysteria and of epilepsy appear completely independent of each other, and in attacks perfectly distinct; (2) Hystero-epilepsy with combined crises, in

which hysterical and epileptic symptoms are commingled in the same attack. In the first variety the same patient is the victim of two distinct diseases, hysteria and epilepsy. The second, hystero-epilepsy proper, is the disease which will be especially discussed in this paper. It would be best to confine the term hystero-epilepsy to this form. Confusion would thus be avoided.

Between hystero-epilepsy with combined crises, or grave hysteria, and true epilepsy the separation is complete. The disease under consideration is hysteria, not epilepsy. The affinities between hystero-epilepsy and common hysteria have been thoroughly established. The differences are of degree, not of kind. Vulgar or mild hysteria is but the rudimentary state of grave hysteria.

Hystero-epilepsy has long been known under various names—as epileptiform hysteria, by Loyer-Villermay and Tissot; as hysteria with mixed attacks, by Briquet; as hysteria major or grave hysteria, by Charcot.

The greatest impulse to the study of hystero-epilepsy in recent years has been given by the brilliant labours of Charcot and his pupils and assistants, in his famous service at *La Salpêtrière*. In his lectures on diseases of the nervous system[1] (edited by Dr. Bourneville), and in various publications in *Le Progrès Médicale* and other journals, Charcot has re-investigated hysteria major with great thoroughness, and has thrown new light upon many points before in obscurity. He deserves immense credit also for the work which he has stimulated others to do.

Bourneville, well known as the editor of some of Charcot's most valuable works, has published, alone or with others, several valuable monographs, both upon hysteria and epilepsy.[2]

The most valuable work on hystero-epilepsy, however, because the most elaborate and comprehensive, is the recently-issued book of Richer,[3] entitled "Clinical Studies on Hystero-Epilepsy, or Grave Hysteria." Richer was for a time interne in the *Salpêtrière* Hospital, and, with Regnard, pursued his investigations under the superintendence and direction of Charcot. His book is a volume of more than seven hundred pages, containing a vast amount of information, and profusely illustrated, in large part by original sketches by the author. Charcot himself has written for it a commendatory preface.

[1] Leçons sur les Maladies du Système nerveux. A portion of these lectures have been translated by George Sigerson, M.D., M.Ch., and published by the New Sydenham Society of London, and reprinted in 1878 and 1879 in *The Medical News*.

[2] Bourneville, Recherches clinique et thérapeutique sur l'Epilepsie et l'Hysterie, 1876; Bourneville et Voulet, De la contracture hystérique permanente, 1872; Bourneville et Regnard, Iconographie Photographique de la Salpêtrière. I have made special use of the second volume of the last of these works.

[3] Études Cliniques sur l'Hystero-Épilepsie, ou Grande Hystérie, par le Dr. Paul Richer. Paris, Adrien Delahaye et Emile Lecrosnier, Éditeurs, Place de l'Ecole de Médecine, 1881.

My object in this paper, after presenting the details of two original cases, is to give a clear and full description of hystero-epilepsy as studied in France. In its preparation I have made liberal use of the valuable volume of Richer, in which is embraced much of the work of Charcot and his scholars. To the kindness of Professor E. C. Seguin, of New York, I am indebted for a copy of the work of Richer.

For the opportunity of studying and treating the following case I am under obligations to Drs. Charles S. Turnbull and J. Solis Cohen, the patient having been for several months under their care at the German Hospital of Philadelphia. Carefully prepared notes of the case were furnished to me by Drs. H. S. Bissey and H. W. Norton, resident physicians at the hospital. I am also under great obligations to my friend, Dr. J. M. Taylor, for a series of sketches of the positions assumed by the patient at different stages of the attack. Dr. Taylor was present with me during one of her worst seizures, and the sketches (Figs. 1, 2, 3, 4) are faithful and accurate representations.

CASE. I.—R., æt. 21, single, was first admitted to the German Hospital November 13, 1879. Between her ninth and twelfth years she had had several attacks of chorea. During childhood she was often troubled with nightmare and unpleasant dreams; she often felt while asleep as if she was "held down by hands." She went to school until twelve years old. Up to this age she was frequently beaten about the head and body. When between twelve and thirteen she went into service. Her menses did not appear until she was nearly eighteen. Before and at her first menstrual epoch she suffered severe pain and cramp. During the first year of her menstruation, while at Atlantic City, the flow appeared in the morning and she went in bathing the same afternoon. She stayed in the water two hours, was thoroughly chilled, and the discharge stopped. Ever since this time she had only menstruated one day at each period, and the flow had been scanty and attended with pain.

According to the patient's story, when about eighteen she kept company with a man for five months, and after having put much confidence in him, learned that he had a wife and two children. This episode caused her great worriment. She positively denied seduction. She became much depressed. She no longer cared for society. In the evening she often went on long trips alone. Once she wandered several miles from her home to Fairmount Park, and was brought home by one of the park guards. She professed that she never knew how she got to the Park.

September 2, 1879, she was seized in the street car with a "fainting fit." On coming-to she found that her left arm was affected with an unremitting tremor. Seven weeks later she was admitted to the German Hospital. She had severe spasmodic attacks, and the diagnosis of hysteria was made. She remained in the hospital about four weeks. On leaving she again went into service. She was re-admitted June 9, 1880, in an unconscious or semi-conscious condition. She had been on a picnic, and while swinging was taken with an attack of spasm and unconsciousness. During two hours after admission she had a series of convulsions. After this she had similar attacks two or three times a week, or even oftener.

I first saw her about the middle of January, 1881. She had an hysterical face; but was possessed of considerable intelligence, and, when ques-

tioned, talked freely about herself. The most prominent physical symptom that could be discovered was a large tremor, affecting the left arm, forearm, and hand. This was constant, and had been present since her admission to the hospital. The left half of her body was incompletely anæsthetic, the anæsthesia being especially marked in the left forearm. Ovarian hyperæsthesia could not at this time be made out. She was, however, hyperæsthetic over the occipital portion of the scalp, and the cervico-dorsal region of the spine. Pressure, or manipulation of these regions, would in a few moments bring on an attack of spasm. The attacks, however, usually occurred without any apparent exciting cause.

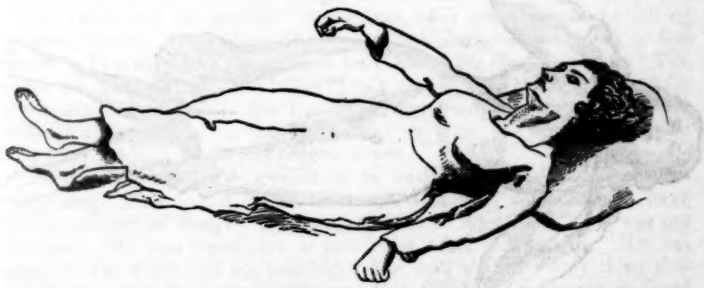
For a period of from six to twelve hours before an attack she usually felt dull, melancholy, and strange in the head. Frequently she had noises like escaping steam in her ears, but more in the right ear than in the left. She complained of cardiac palpitations. She usually had pain in the small of her back. Her limbs felt weak and tired. Just as the attack was coming on, her eyes became heavy and misty, her head felt as if it was sinking backward, and if not supported she would fall in the same direction.

I had the opportunity on several occasions of watching every phase of the attack, or series of attacks, the spasms continuing sometimes from one to four or five hours. The order of events was not always the same, and yet a general similarity could usually be seen in the successive stages of the phenomena. I will try to give an outline of the different stages and phases as observed on an occasion when the seizures were severe.

After lying down, the first noticeable manifestation was a twitching of the eyelids and of the muscles of the forehead and mouth. Her head was next moved from side to side, and she looked around vaguely. Respiration became irregular. In a few moments a convulsive tremor passed down her body and limbs.

Her arms were now carried outwards slightly from the body, the hands being partly clenched. The lower extremities were straightened, the left foot and leg being carried over the right (Fig. 1). Her limbs were rigid.

Fig. 1.

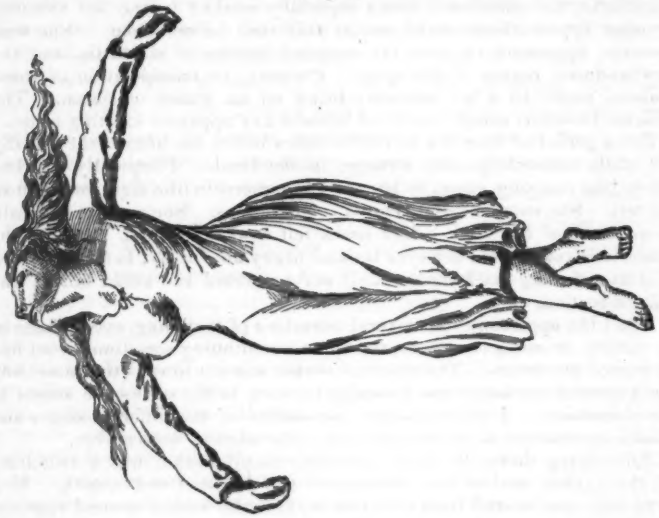


Her mouth was closed, the teeth being ground together. Consciousness was lost, and respiration seemed to stop.

A series of strong convulsive movements next ensued. Her entire body was tossed up and down, and twisted violently from side to side. Sometimes she assumed a position of opisthotonos. Her whole body was then again lifted and hurled about by the violence of the movements.

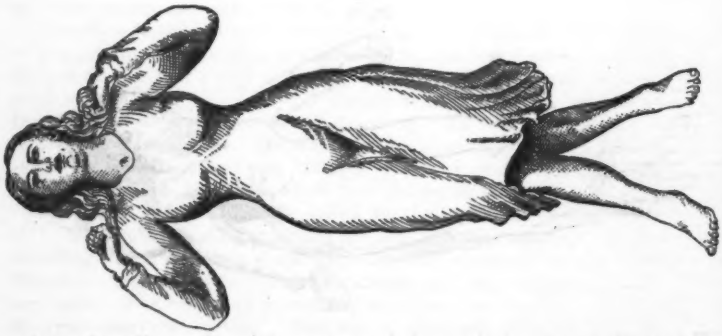
A few seconds later she became quiet but rigid, in the position shown in Fig. 2, corresponding to the position of crucifixion of the French writers.

Fig. 2.



Soon she assumed the position represented by Fig. 3, and the convulsions were renewed with violence, the patient's limbs and body being frequently tossed about, and the latter sometimes curved upwards. After

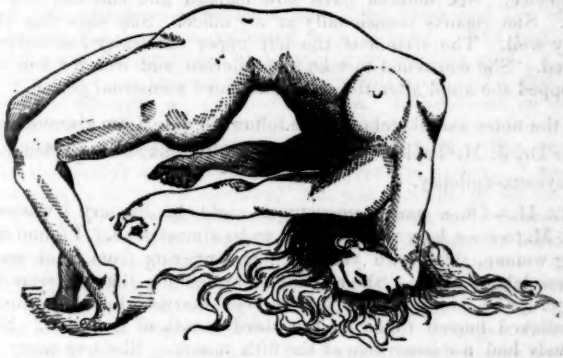
Fig. 3.



these movements had continued a brief period, the patient became calm and partially relaxed. The respite was not long. A series of still more remarkable movements began, chiefly hurling and lifting of the body. Eventually, and apparently as a climax to a succession of efforts directed to this end, she sprang into the position of extreme opisthotonos repre-

sented in Fig. 4. This sketch, by Dr. Taylor, is a very faithful view of her exact position. She remained thus arched upwards for a minute or even more. A series of springing and vibratory movements followed, the body frequently arching.

Fig. 4.



As the spasms left she sat up on her bed, and at first looked around with a bewildered expression. She turned her head a little to one side and seemed to gaze fixedly at some object. Her expression was slightly smiling. When spoken to she looked straight at the one addressing her, but without appearing to know what was said, and the next moment the former position and attitude were resumed. After a few minutes she lay down muttering incoherently, and in about a quarter of an hour fell asleep.

I have simply described one attack. Sometimes she would have several in succession; or the spasmodic manifestations would be repeated several times in a regular or irregular manner. Strong pressure in the ovarian regions usually would not cut short the spasms. They could be stopped, however, by etherization or by active faradization of the limbs or trunk. She did not always conduct herself in the same manner in the period which succeeded the spasms. Sometimes, after getting into the sitting posture, instead of smiling, she would look enraged and speak a few words. The following expressions were noted on one occasion: "You know it! Yes, you do! Yes! Yes!" Often she was heard to mutter for hours after the attack. Her lips would sometimes be seen to be moving without any words being heard. Sooner or later she would fall into a sound sleep which would last several hours.

During the spasms she seemed to be entirely unconscious of her surroundings. To a looker-on her movements seemed sometimes to have the appearance of design; but I soon convinced myself that such was not the case. She was insensitive to painful or other impressions. Her expression was blank and unchanging. She said that the only thing that she remembered about the attacks was that she heard a strange confused sound; this was most probably just as she was returning to consciousness.

Numerous remedies were tried without any apparent effect. These included sodium and potassium bromides, iron, zinc salts, physostigma, cimicifuga, camphor, ether, etc. A uterine examination was made, but nothing especially calling for local treatment was found. She was placed upon equal parts of tincture of valerian and tincture of iron, in half tea-

spoonful doses three times daily. Capsules of apiol were also ordered to be taken three times daily just before and during her menstrual period. Her menses became more profuse and continued longer. The attacks began to diminish in frequency and became less severe. In March, not having had a seizure for several weeks, she left the hospital and again went into service. Six months have now elapsed and she has not had an attack. She reports occasionally at my office. She says that she feels entirely well. The tremor of the left upper extremity has entirely disappeared. She continued to take the valerian and iron for four months, but stopped the apiol after the second or third menstrual period.

For the notes and sketches of the following case I am also under obligations to Dr. J. M. Taylor. The case may, I think, be regarded as one of *acute* hystero-epilepsy.

CASE II.—On a most tempestuous night in January I was called at 11½ P. M. to see a lady who was said to be almost dead. I found a robust looking woman, thirty-two years of age, suffering from what seemed to be severe labour pains. She at once informed me that she feared a miscarriage. She had not long before been married for the second time. She believed herself to be in the third month of gestation. She had previously had a miscarriage at the fifth month. She was eager to have a baby, and fearing a second miscarriage, she had consulted a physician, who prescribed an injection of nutgalls and alum to strengthen the womb. Each of the three or four applications had left a "queer sensation." Just before sending for me, and after an injection, she had been seized with "cramps" in the womb. I judged her anxiety about a miscarriage well-grounded as her pains were recurring at intervals of ten minutes. A vaginal examination was refused. Morphia was administered subcutaneously. A female attendant injected laudanum and sweet oil into the vagina.

The paroxysms of pain grew farther apart, but became progressively more violent and protracted. The patient rolled about the bed in agony, and yet answered questions, and sometimes gave suggestions. The injections of morphia sulphate were repeated until a grain had been used, but with no apparent effect. The respites, at first passed in quiet conversation, were later occupied by sleep due to exhaustion. Towards half past one o'clock she had a pleasant nap, with regular breathing, which lasted about half an hour; but at the end of this time she abruptly started up in a state of violent tonic spasm with intense dyspnœa. Her eyes were fixed and staring, the angles of her mouth were drawn down. Seizing me by the arm, she pointed to her chest, mutely imploring air. She signed to me to give her a glass of water, which she saw on a table near by. As it was placed to her lips, she grasped my wrist and dashed its contents over her face and breast; but still with no relief. The windows and doors were opened in vain. She fell back with a groan and writhed.

The pupils were neither contracted nor dilated. Internal strabismus of one side and marked injection of the cornea were present. Artificial respiration was attempted. At first the efforts were fruitless, but later they had good effect. She uttered hoarse cries and was convulsed. In her contortions she rolled and tumbled so violently that it required the combined efforts of her husband and myself to keep her in bed. A little later her breathing grew easier. The distressing symptoms now subsided. The entire seizure lasted about sixteen minutes. She passed into

a deep, lethargic sleep from which, however, she could be aroused to answer questions.

Some facts in regard to her previous history were learned from herself and others. Her physique was noticeably fine. She assured me that her health had always been excellent, and that she had a particularly good appetite and digestion. She sometimes over-indulged in delicacies. She had had two attacks of pneumonia, one eight years and the other five years before, the latter complicated with pleurisy. She had recently suffered from slight oppression of breathing on catching cold.

I now insisted on making a vaginal examination, and found a small hard os uteri showing no tendency to dilate. I discovered no evidences of pregnancy.

The interval of repose lasted from 2.15 to 3 A. M. The deep sleep alarmed the family even more than the previous action. I was called upon incessantly to "do something," but was content to let the patient rest. The sleep grew more natural as time wore on. Some officious females roused the patient to see if she was alive, when she peremptorily bid them to "let her alone."

Dr. A. E. Stocker was sent for to see the case in consultation, and came at once through the storm, arriving a little after 3 A. M. The last and most protracted seizure was then under way. It began suddenly, as before, from a peaceful slumber. The poor woman, gasping for breath, choking, the tears streaming down her face, clutched at those about her bed and at the empty air. The action was that of one unable to swim, thrown into deep water, and struggling to catch at a slippery bank. I forcibly manipulated her arms to excite easier breathing, and with some success. Several times she gasped out, "Oh my God!"

Fig. 5.

Internal strabismus was again noticeable, but neither contraction nor dilatation of the pupils.

She again writhed about the bed in serpentine curves, contorted and convulsed, frequently arching the back. Presently, raising herself quickly to her knees, in the position shown in Fig. 5, she uttered a series of convulsive sobs and fell back into a state of complete opisthotonos (Fig. 6). This kneeling posture was a favourite attitude, and had been assumed several times before during the paroxysms. The opisthotonos was maintained for only a few moments, when she dropped down and again writhed convulsively. A few moments later her body was again hurled upwards into the condition of opisthotonos, which was maintained as before for a brief period. The same programme con-

tinued to be repeated. From the backward bow she several times dropped partly on one side, and then wriggled over to her favourite kneeling posture, from which again she resumed the backward arch. The arched position was repeated seven or eight times altogether. The later spasms were of longer duration and firmer balance. Pressure over the ovaries was tried several times while she was in the arched position, but with no effect on the spasm.

Fig. 6.

An application of mustard to the spine was now made on the suggestion of Dr. Stocker. This seemed to have an excellent effect. It was followed by an enema of laudanum and half a wineglassful of water. She now appeared to sleep for a time. We were just beginning to congratulate ourselves, when another paroxysm surprised us. Upon its cessation valerianate of ammonia was administered. This caused intense nausea, and the vomiting of a large mass of undigested food, to the great relief of the patient. Several doses of Hoffman's anodyne were given, the patient continually becoming more quiet and comfortable. The last most severe seizure continued for twenty-two minutes. Several times before daylight she seemed about to have another attack, having some twitching and writhing. These seizures were, however, abortive. She eventually got into a profound sleep. She had no more bad symptoms.

Great exhaustion and soreness of the thoracic muscles were the only noticeable after-effects. The patient never seemed to fear a fatal result, except when during the spasm she appeared to be unable to get her breath. I failed to discover any history of nervous disease in the family. The patient herself had had no tendency to nervous disorders before the present attack. Her urine contained no albumen. One month after the attack the menstrual flow came on naturally. Five months have now elapsed, and she continues in good health.

I will next consider at some length the phenomena of the attack of hystero-epilepsy or grave hysteria, when the disease presents itself in what might be termed the regular and complete type. The cases whose histories I have just given can then be better understood.

The attack of hystero-epilepsy is always preceded, and sometimes for several days, by prodromes which are often numerous and varied, em-

bracing trouble of all parts of the economy. Richer studies them under four heads, namely, 1st. Psychical affections, hallucinations; 2d. Affections of the organic functions; 3d. Affections of motility; 4th. Affections of sensibility.

Psychical troubles are the first to appear. For hours or days before the attack the patient is changed. She is incapable of sustained work. She neglects her usual occupations and disdains her amusements. Painful memories are recalled. Insignificant circumstances assume exaggerated importance in her eyes. Sometimes she falls into melancholy, which may go on to a state of profound despair. Her dress is neglected. She abandons propriety almost. Her expression shows the presence of hallucinations. These paroxysms of sadness or melancholy may alternate with moments of foolish gayety. Bourneville and Regnard mention one patient who, three or four hours before her attacks, would begin a long repertory of songs and would not cease until the convulsive crisis. The affective faculties are at the same time exalted or perverted. The patients are unquiet, jealous, suspicious, and very irritable. They sometimes preserve a stubborn mutism; but ovarian compression, so potential in relieving other hysterical manifestations, never fails to unloosen the tongues of the most obstinate, even when all other means have been of no avail. They are quarrelsome; they cannot rest; they even turn against inanimate objects, breaking anything upon which they can lay their hands. Their agitation, accompanied at times by great outcries, has sometimes a frightful aspect, but never offers the danger of the delirium of epileptics; they seem simply to be tormented with a surplus of energy and activity. They must be up and doing. Their actions, however striking or frightful, seem to be without cause, without "rhyme or reason" (Moreau).

One of Charcot's patients, whose attacks usually come on at the menstrual period, and last several days, quits work, complains extravagantly and becomes violently agitated, sometimes she strips herself partly, or destroys a portion of her clothing. She leaves her bed. She runs half-naked, her hair in the wind, her head turning backward, balancing her body, leaping first on one foot and then on another, now accelerating and now retarding her steps, and shaking her arm above her head. Intemperate weather proves no obstacle. "I have seen her," says Richer, "in a beating rain, in the mud, work herself into transports." She puts forth ferocious cries, or declaims a senseless discourse; demands pardon of God; pronounces maledictions; deplores her destiny; exhausts herself in supplications, and appeals to heaven and to man for succor. She leaps over benches, strikes herself, and rolls against the walls with complaints and groans. Suddenly she lets herself fall and remains immobile, as if without life; then she gesticulates with violence, striking her arms on the ground and chafing her knees with the gravel, she turns over and over. Sometimes a slight epileptoid paroxysm supervenes. She loses consciousness; her limbs

become rigid in extension; a slight tremor agitates her body. After a few seconds she again begins her disorderly course. A passing contraction of a limb sometimes occurs. The arm is sometimes contracted at the elbow and twisted backwards, the fist clenched; sometimes held in front of the body; or both upper limbs may be in a state of contracture, one before and the other behind the body. Sometimes again the contracture attacks the leg; sometimes it is crossed,—for instance, the left upper and the right lower limb will be affected.

Hallucinations are frequent in this prodromic period. They may affect all the senses, and more particularly those of sight and hearing. The most common hallucinations of sight consist of visions of animals—black cats, gray rats, spiders, ravens, vipers, etc. Fabulous animals are sometimes seen. The vision of the animal or animals is not stationary; it appears to be moving, and in a direction which is always the same for the same patient, as was first pointed out by Charcot. The cats, rats, etc., in passing before the patients, run from the left to the right or from the right to the left, according as the hemianæsthesia is situated on the left or on the right. The point of departure of the hallucination is always from the side of the hemianæsthesia. Most frequently the phantom comes from behind and passes away in front of the patient. These visions may be variously coloured. The patient sees also scintillations, brilliant balls, and diverse colours.

Hallucinations of hearing are not less common than those of sight, They affect chiefly the ear of the hemianæsthetic side. The patients hear music; voices, which appeal, threaten, command, etc.; whistlings in the ear or ears, the rolling of a wagon, the sound of a clock, of a trumpet, of birds which sing in the head, etc.

These hallucinations come during the day, pestering the patients even when in the society of their companions; but during the night they acquire their greatest intensity, becoming visions and noises of the most frightful character. Sometimes the scenes are those of romance; sometimes visions of the dead; sometimes of funeral pageants. The nocturnal hallucinations are often of an erotic character. The patients are the victims of imaginary amours. Lovers come to them and compel them to submit to their embraces. In the morning after these hallucinations they complain of extreme fatigue, and look pallid and dejected.

Troubles of the organic functions, of digestion, secretion, respiration. and circulation, are also among the prodromes in hystero-epilepsy. Want of appetite, perverted taste, vomitings are often present. Nausea is sometimes manifested when no food has been taken, and is due to the spasmodic contraction of the diaphragm, stomach, and œsophagus. Spasm of the throat (*suffocation hysterique*) is a very common prodromic symptom. Borborygmi and tympanites are usually marked. Ptyalism is sometimes observed, and assists in giving rise to the froth which escapes from the

lips during the epileptoid period. Just preceding the attacks the patients sometimes complain of a bad taste in the mouth. The urine is abundant, clear, and colourless. Complaints of oppression and want of air are made. Spasm of the larynx, hiccough, laughing, laryngeal cough, loss of voice, cries like those of animals, yawnings are among the respiratory troubles. Cardiac palpitations, intense and constant, are common. Vaso-motor troubles are not rare; flushing is observed sometimes. Rosenthal reports a case in which the attack was preceded by a sensation of coldness and discoloration of the hands and finger-ends.

Myasthenia, or loss of muscular power, exists as a permanent symptom of hystero-epilepsy, and always accompanies the anæsthesia, appearing or disappearing with it. On the approach of the attacks the muscular feebleness increases; often the patient cannot use the anæsthetic arm or leg. The gait is unsteady. The patients are not solid on their legs. In particular, the limb of the anæsthetic side bends under its weight. Painful cramps, convulsive movements, and tremor, often show themselves. The patellar tendon reflex is exaggerated. The convulsive movements (*secousses*) are similar to those which are met with in true epilepsy. They may be partial or general. If the patient is walking she may be thrown back upon the ground; if sitting down she may be abruptly lifted from her seat to be thrown again heavily. These attacks come on by preference at night, and sometimes hurl the patient out of bed. These convulsive movements, or epileptoid commotions, sometimes occur without the attacks following. They may be considered as the rough draught of the epileptoid period. They are the prelude to the epileptiform convulsion.

Contracture is very often a precursory phenomenon of the paroxysm. It is usually partial, and begins abruptly. It passes from one limb to the other. Sometimes it invades all the limbs. The position of the contractured limbs is very variable, but in the same patient it always reproduces itself in the same fashion. Charcot, Bourneville and Regnard, and Richer, all give admirable illustrations of different forms of contracture. In one case, the right arm and wrist are flexed, and the hand held at the level of the shoulder with the fingers extended. Another while standing becomes immobilized by the contracture, which invades all her limbs. In another, the point of her tongue turns backwards and upwards and glues itself to the palate, and the jaws are tightly closed.

Sometimes slight little epileptoid seizures, which are like detached fragments of the great attack, mingle with the other prodromic signs.

Affections of sensibility are very prominent in the prodromes of hystero-epilepsy. Total anæsthesia is sometimes present, but more often it is hemianæsthesia. It may not be complete; pricking may be felt, but is not painful; the condition, therefore, is analgesia. During the days preceding the attacks, marked anæsthesia, if it does not already exist, may replace the analgesia.

Cutaneous hyperæsthesia limited to certain nerve territories may be met with among the prodromes. Special sensibility is equally affected, and on the same side as the general sensibility. Sometimes we have achromatopsy or colour-blindness. Deafness in one ear has also been observed.

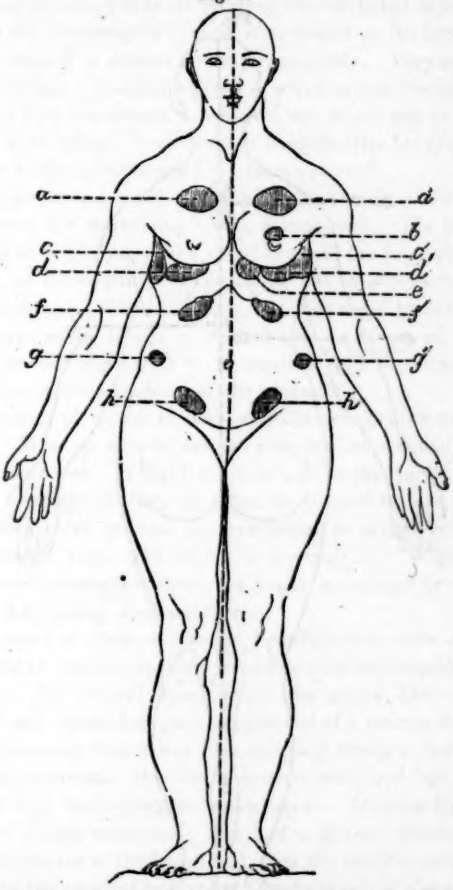
Certain painful phenomena constitute properly what might be called the *aura hysterica*. These are the immediate precursors of the attack. Ovarian hyperæsthesia is the most striking of these. To Charcot we owe the most careful study of this symptom. It is a severe pain; the patients cannot support the least touch. A certain degree of swelling of the abdomen may be present. Sometimes the pain does not show itself spontaneously; pressure is required to discover it, in which case anæsthesia of the skin and muscles is present, showing that the seat of the pain is not in the skin or muscles. The seat of pain, according to Charcot, is without doubt the ovary. He gives the following rule for localizing it: "From a line uniting the anterior superior spines of the ilia, let fall the perpendicular lines which form the lateral limits of the epigastrium, and at the intersection of these vertical and horizontal lines will be found the focus of pain."

Among the most interesting prodromic affections of sensibility are the *hysterogenic* or *hystero-epileptogenic zones*. These have been well studied and described by Richer, from whose work Figures 7 and 8 have been taken. Brown-Séquard has shown that some lesions of the spinal cord, of the medulla oblongata, and of the nerves, and in particular of the sciatic, will determine in lower animals the production of an affection, in which manifestations which approach closely those of epilepsy, show themselves a certain number of days after the experimental traumatism. These animals thus rendered epileptic are sometimes attacked with convulsions spontaneously; but it is also possible to provoke these attacks by exciting a certain region of the skin which Brown-Séquard designates as the *epileptogenic zone*. This zone, situated on the same side of the body as the nervous lesion, has its seat about the angle of the lower jaw, and extends towards the eye and the lateral region of the neck. The skin of this region is a little less sensitive than that of the opposite side, but touching it most lightly provokes epileptic convulsions. The simple act of breathing or blowing on it brings about the same result.

Something analogous to this epileptogenic zone has been noticed among hystero-epileptics, and has been pointed out by several writers, among whom Richer mentions Willing and Turk, Charcot, Schützemberger, Rosenthal, and Baillif. Richer gives the particulars of a number of cases. In one patient the hyperæsthetic zone was between the two shoulder-blades. Simply touching this region was sufficient to provoke an attack, and this was more easily done if near the time of a spontaneous seizure. After the grave attacks, the excitability would seem to be exhausted, and pressure in the zone indicated would not cause any convulsive phenomena.

A second case presented a similar condition. If touched over the dorsal spine between the shoulders, she felt a violent pain in the belly, then a sense of suffocation, which brought on at once a loss of consciousness.

Fig. 7.

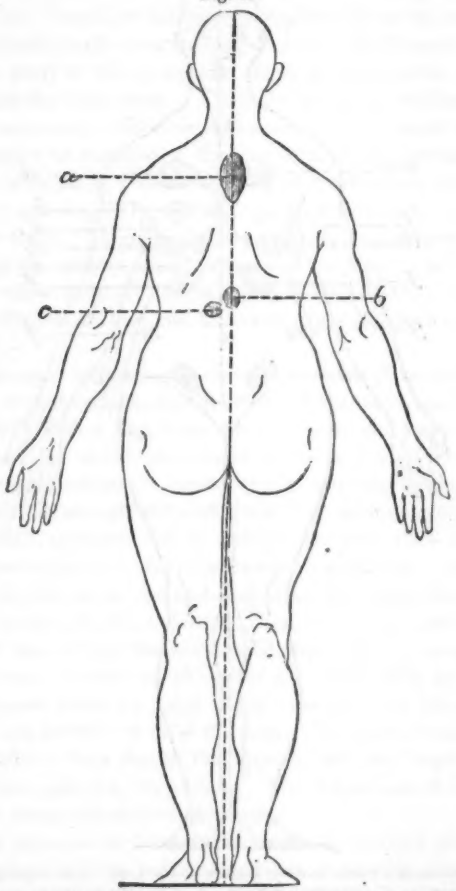


Principal Hysterogenic Zones, anterior surface of the body. *a*, *a'*. Supra-mammary zones. *b*. Mammary zones. *c*, *c'*. Infra-axillary zones. *d*, *d'*, *e*. Infra-mammary zones. *f*, *f'*. Costal zones. *g*, *g'*. Iliac zones. *h*, *h'*. Ovarian zones.

In a third patient the hysterogenic zone was different. It was double. It was necessary to touch two symmetrical points situated to the outside and a little below the breasts in order to bring on the hystero-epileptic convulsions. Touching one of these points did not produce any result. Other cases are given in detail, but a glance at the two Figures (7 and 8),

will show some of the principal hysterogenic zones both for the anterior and posterior surfaces of the body. A zone of ovarian hyperæsthesia was common to all the patients. It did not differ essentially from the other hysterogenic zones. If the ovarian hyperæsthesia existed along with

Fig. 8.



Principal Hysterogenic Zones, posterior surface of the body. *a*. Superior dorsal zone. *b*. Inferior dorsal zone. *c*. Posterior lateral zone.

other hysterogenic points, the excitation of the ovarian region was always the most efficacious. The hysterogenic zones occupy diverse points of the skin and of the deeper-seated parts; but if they vary in different patients, they always occupy the same place in the same case. They are found on the trunk exclusively; they are more frequently in front than behind; in

front they occupy lateral positions and are often double and symmetrical; behind they are more often single and median; they exist more frequently to the left than to the right, and the unilateral zones have always been met with on the left side.

The hysterogenic zones bear no constant relation to the hemianæsthesia. It is true that the ovarian pain is most often seated on the hemianæsthetic side, but sometimes it is present on the opposite side. Very often the zone is in the median line. Cases are given in which it was double with hemianæsthesia and total anæsthesia, in which it was single and to the left with anæsthesia of both sides. Various other irregularities between the anæsthesia and the hysterogenic zones have been observed.

The hysterogenic zones are not at all times equally excitable. They are more so when the convulsive attack is imminent. The patient about to have an attack is compared to a vessel too full, the least shock causing it to run over, or, better still, to a Leyden jar the least contact with which occasions a discharge. When the patient is discharged by the convulsion, the hysterogenic zones lessen in excitability or disappear completely. Other circumstances, such as a vivid emotion, will sometimes cause the same diminution or disappearance of the excitability.

Ovarian pressure gives rise to the spasmodic attacks; the same pressure arrests them. What is true of ovarian compression is equally true of all the hysterogenic zones. A light touch brings on the convulsions, which have scarcely commenced when they can be stopped by a new excitation of the same point. In general the excitation to arrest the convulsion should be stronger than that which determines it. When a patient possesses several hysterogenic zones, the attack occasioned by exciting one can be arrested by acting upon another.

In Case I. many of these prodromic manifestations were not wanting. I have no notes of special psychical troubles, wild excitement, or marked hallucinations. For several hours before the attack, however, she was unusually dull and melancholy, and complained of a strange feeling in the head. She frequently had noises like escaping steam in her ears. She had cardiac palpitations. Her limbs became weak and felt tired. The left half of her body was incompletely anæsthetic. Ovarian hyperæsthesia was never very clearly made out. She had a distinct hysterogenic zone on the posterior aspect of the body, including the median occipital region of the scalp and the cervical and upper dorsal district of the spine, a portion of the irritable area corresponding to the superior dorsal zone of Fig. 8. The twitchings, movements of the head, irregular breathing, and convulsive tremor, just preceding loss of consciousness, belonged properly to the prodromic stage.

In Case II. no opportunity to study prodromes was, of course, afforded.

The attack having fully begun is divided by Richer into four distinct periods:—

1st. The epileptoid period.

2d. The period of contortions and of great movements.

3d. The period of emotional attitudes.

4th. The period of delirium.

The periods themselves are subdivided into phases.

The first or *epileptoid* period of the hystero-epileptic attack, receives its name from its resemblance to a seizure of true epilepsy, in which three phases always reproduce themselves in the same order, namely:—

1st. Abrupt tetanization of the muscles of the entire body, with, at the same time, visceral spasms and loss of consciousness.

2d. Clonic convulsions of the tetanized muscles.

3d. General resolution and stertor.

The epileptoid period of the hystero-epileptic attack, in like manner, is best divided into three phases:—

1st. A tonic phase.

2d. A clonic phase.

3d. A phase of resolution.

When the epileptoid period comes on spontaneously it is usually preceded by various convulsive phenomena already alluded to in speaking of the prodromes. During the few seconds that these phenomena last, the patient is conscious of what is passing around her, but her intelligence is becoming obscured. Soon the three phenomena come on which mark the beginning of the epileptoid phase, namely loss of consciousness, arrest of respiration, and muscular tetanization. If the attack is brought on by outside interference, by pressure, excitement, etc., the patient may fall with great suddenness. Sometimes an attack surprises the patient during her sleep.

Loss of consciousness is complete during the entire epileptoid period.

According to Charcot the cry which marks the onset of an attack of true epilepsy is not a manifestation here, although sounds due to spasm of the muscles of the larynx and throat are sometimes heard.

In the tonic phase of the epileptoid period the muscular tetanization does not arrive at once at its maximum. In the first place we have a tonic phase with movements of large radius, or tonic convulsions. These have a certain slowness; they are executed by parts of the body the muscles of which are already rigid and contracted. Sometimes, the muscles being rigid in extension, the convulsions produce a displacement of the entire limb; more frequently the movements are those of circumduction.

The head turns backwards slowly, causing the neck to jut and appear swollen; or it rotates, turning the face to the side where the convulsions predominate; sometimes it remains straight, a little inclined forward and sinking between the shoulders, which are elevated. The face, excessively pale at first, soon becomes congested. The forehead is wrinkled; the eyes are convulsed and hide their pupils beneath the upper lids, or they roll in

their orbits. The pupil is usually dilated; sometimes, on the contrary, it seems to be contracted. The mouth opens widely, and the tongue is sometimes put out and moved from one commissure to the other; or, on the other hand, the jaws may be firmly closed, or the patient may fiercely grind or gnash the teeth. Respiration is arrested. The swelling of the neck here seen is not met with to the same degree in true epilepsy.

After the tonic convulsions the patients often become immediately immobile through muscular tetanization carried to its height. The position of the patient thus immobilized is variable; most frequently it is in complete extension and dorsal decubitus. The head is thrown backwards, the neck swollen, the veins standing out like cords. The face is cyanosed, puffed, the features contracted and immobile. Froth appears sometimes on the lips. The arms are extended in adduction and in rotation outwards, the wrist flexed, the fist shut; sometimes the two hands, drawn towards the middle of the body, touch by their backs and even may cross. The inferior extremities are equally in extension, the knees strongly brought together, and the feet clubbed, turned either inward or outward. The trunk, stiff as a bar of iron, rests on the back or on one of the sides. It is frequently curved backwards.

One of the positions assumed in this tonic phase is well represented in Fig. 9.

Fig. 9.

The position just described is that which is most common, but it has many variations. The trunk and the limbs, diversely flexed and extended, give to the patients unforeseen and bizarre positions, which would be confounded, without care, with the contortions of the second period; but on close examination, we find that we have muscular tetanization added to the important epileptoid phenomena—loss of consciousness and respiratory spasm. Sometimes the body, curved backwards, simulates to some extent the arched position, the arms, at the same time, extended perpendicularly to the trunk, produce the position of crucifixion, which is also an emotional attitude of the third period.

The tonic phase, which lasts usually about half a minute, is followed by the clonic phase of the first period. This begins by rapid and short oscillations of the tetanized limbs. Sometimes these clonic movements are general, affecting the face, head, trunk, and limbs. More frequently they predominate on one side of the body, and they may be confined exclusively to one side. They surprise the patient in the position taken in the tonic phase; the body, little by little, quits the tetanic position. The suspended respiration returns painfully; inspiration is whistling, expiration jerking; at times hiccoughs occur; noisy movements of deglutition are heard; and the abdomen is agitated with convulsive movements and sonorous gurglings. A calm succeeds, little by little, and ushers in the third phase of the first period, that of muscular resolution.

In the phase of muscular resolution, the muscles are completely relaxed. Movement is absent. The patient lies on her back, the head sinks down upon one shoulder, the face is congested and slightly swollen, the eyes are shut, respiration is established more regularly, but at times is noisy. Sometimes a true stertor is present. Occasionally a certain degree of contraction persists in the entire body or in a limb. The sleep is sometimes interrupted by general convulsive movements, which may completely elevate the patient or roll her together into a heap.

The epileptoid period usually lasts altogether several minutes, two, three, four, or five, rarely more. The phase of stertor and resolution may be prolonged, but the tonic and clonic phases, when they are complete, show a remarkable regularity as regards duration. Numerous observations always gave a total approaching sixty seconds for both the tonic and clonic phases. The sixty seconds could usually be divided so as to give one-half to the tonic and one-half to the clonic phase. The tonic phase even may be subdivided into two equal parts of about fifteen seconds each. The above subdivisions, although noted as the result of many observations, are approximative; the duration of the different phases is susceptible of great variations.

The epileptoid period, complete and regular, has been described, but it may undergo modifications and thus give rise to varieties. It is modified above all either by excess or by deficiency. One of the phases may be prolonged to the detriment of the others, or one or even two of the phases may be wanting.

The second period is that of *contortions and great movements*. Charcot has given to this period the name of *clonism*. This period comprises two phases: 1st. That of illogical attitudes or contortions; 2d. That of great movements.

I will recall here in some detail the accounts given by Richer of these illogical attitudes. For one of these attitudes most of the patients seem to show a marked preference. It is reproduced almost always in nearly the same fashion, and merits the name of the arched position (*arc de*

cercle). In the most common form of the arched position, the body is curved backwards in the form of an arch resting only on the head and the feet. This position is represented in Fig. 10, from Bourneville and Regnard's *Iconographie Photographique de la Salpêtrière.*

Fig. 10.

This form of contortion, the arched position, presents varieties. One patient keeps only one foot on the floor, holding the other in the air. The curve of the body may be more or less complete. Sometimes the patient rests on the upper part of the back or on the shoulders, instead of the head. The patient may rest on the belly or side, the remainder of the body preserving its curved position. Instead of being curved backwards, she may be curved forwards, the posterior plane of the body forming the convexity of the arch.

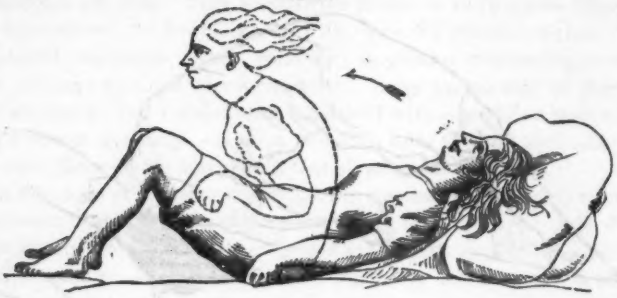
In this phase of the attack the body may assume strange and seemingly impossible attitudes almost without number, some form of the arched position often being discoverable. When the muscles of the face participate, frightful expressions are sometimes produced.

The second phase of the second period of the grave attack is that of *the great movements.* These movements separate themselves from the clonic phase of the first or epileptoid period in that they are much more extended, and do not have any connection with tetanization. They are not compatible with any degree of contracture, and one of the conditions of their production is complete muscular relaxation. They are executed by the entire body or by a part of the body only.

The same movement is sometimes reproduced a number of times in succession with great rapidity and regularity. One of the most frequent of these movements is that represented in Fig. 11, and has been termed the movement of "salutations." It consists in an abrupt flexion of the trunk until the forehead strikes against the knees, then the body quickly straightens itself again, and the back and head violently strike the pillow. The patient takes a point of support, with her feet on the bed, the legs being semi-flexed.

Sometimes the movement is performed by the legs, semi-flexed, being projected upwards, the head and body remaining at rest; or both the head and the legs participate. At other times it is more local; it is perhaps executed by a single member. One patient would quickly lift her body

Fig. 11.



to the arched position until it rested on the feet and hands only, and then would fall again to the bed. She would thus rebound from five to twenty times in succession. Another would suddenly launch her legs in the air, assuming three positions: (1) resting on her back and head, the feet and legs directed nearly straight upwards; (2) resting only on the shoulders and head, the body as well as the legs being projected upwards; (3) resting on the back of the head, the body and legs, unsupported, being hurled into the air at a considerable elevation.

This phase of great movements is often marked at its beginning by a piercing cry, similar to the whistle of a locomotive, prolonged, and sometimes modulated. The movements do not always preserve the same regularity. They consist sometimes of a sort of writhing or wrestling. They are followed sometimes by a sort of fury. They are susceptible of numerous variations, hard to classify. One patient imitates the noise of a locomotive on its journey. The contortions and the great movements nearly always present themselves with the same characters in the same patient. Loss of consciousness is not the rule during this period of clonism as during the epileptoid period. Hallucinations are sometimes present.

The third period of the hystero-epileptic attack, called by Charcot the *period of emotional attitude* or *statuesque positions*, is not always as clearly separated from the second period, as the second is from the first. The delirium which marks this period may begin in the latter part of the second period. An interval of repose between the two periods is rare. It is the most dramatic stage of a highly dramatic disease. The patient is a prey to hallucinations which ravish and transport her to an imaginary world.

When the patient is awakened, she remembers what has passed in this period. During it she is completely insensible to outside excitation.

Two processes only will cause her dream to vanish and bring her back to reality: these are irritation of the hysterogenic zones, particularly ovarian compression, and the electric shock. The subject of the hallucinations is most frequently borrowed from the past life of the patient. Sometimes, however, the hallucination is a pure creation, which varies with the richness of her imagination. Usually, two phases of hallucinations can be distinguished: (1) the phase of gay hallucinations; (2) the phase of sad hallucinations. These may succeed each other, or may intermingle.

I will give a few illustrations of the shapes taken by these hallucinations.

One patient, reported by Richer, retraces by her exclamations and positions, chiefly two events of her existence: the first, terrible in character, marked her entrance into life; when ten years of age she became the victim of lust. The second has reference to a lover, and causes her a pleasure which she does not seek to dissimulate. The details of her hallucinations are given by Richer with great minuteness. I will glance at some of the chief points in order to make clear the nature of this emotional period. During the phase of great movements her physiognomy indicates that the hallucination has commenced. She seeks to escape from her persecutor. The movements terminate with much agitation. The patient seems struggling to escape from some one's grasp. She cries for help, reproaches, opposes. Suddenly, she supplicates, her arms extended forward, she rolls on her bed crying, "Pardon! Pardon!" Sometimes with a vigorous movement she gets up again, and then throws herself on her knees in the position shown in Fig. 12. Her voice is always supplicating, full of anguish and terror. She falls again on her bed, lies upon her back, extended in the position of the cross, cries of anger and fright still escaping from her. Still later she becomes menacing and furious. The threats are sometimes interrupted by blows. She cries for pardon and again reproaches. Nearly all her words are spoken in low tones.

Fig. 12.

Another scene now passes before her. It is a pure creation of the imagination, but none the

less fills her with fright. She sees an immense chariot covered with funereal drapings and full of frightful skeletons, whose hollow eyes dart forth fire.

Sometimes by a sudden transition the gay phase of her hallucination comes on. A gesture of terror or menace is suddenly interrupted. The patient is as one charmed by an apparition; she shows astonishment, surprise mingled with joy; her look is directed upwards. She extends her arms, and exclaims, "Oh come! come!" She appeals pressingly and repeatedly to the apparition to come. Finally, she lies down on her back, opens her arms as if to draw the phantom to her, and covers it with kisses. She becomes calm little by little. She mocks at some imaginary personage. She listens, exclaiming: "Hark! Hark!—Oh! the beautiful music!" It is military music in a great garden where she walks on the arm of her beloved. This hallucination always marks the approach of the end of the attack. Soon she sees rats; movements of fright and lamentations follow. The delirium of the fourth period begins.

Other cases are related by Bourneville and Regnard, and by Richer, some at great length and with vivid details. Camera and pencil are frequently called to assist the pen in presenting scenes which read as if drawn from an exciting drama or novel. A large number and great variety of emotional attitudes are sometimes presented by the same patient during a single attack. Positions are taken by some that are not assumed by others. The same patient commonly repeats many of the same attitudes in different attacks. Among the expressions and attitudes which Bourneville and Regnard have succeeded in photographing are those illustrating emotions of menace, appeal, amorous supplication, erotism, ecstasy, mockery, beatitude, etc.

The positions assumed correspond with the expression of countenance. The patient kneels with clasped hands and a supplicating look; with fists clenched and arms tense, with one foot advanced and with head and body half rotated, she frowns defiance; she lies upon her back with joyous face, and with body and limbs keeping time to a jolly song; with laughing features she claps her fingers together as if imitating a performance with castanets, etc. etc.

The position of crucifixion (*crucifiement*), as shown in Fig. 13, from Bourneville and Regnard's *Iconographie Photographique*, is one not infrequently assumed, often with some beatific expression. This position of crucifixion, as I have already pointed out, is sometimes also seen in the spasmodic phases of the attack.

Hallucinations of sight occupy a prominent place in the third period. One patient sees huge beasts with immense wings, enormous claws, and a great crooked beak; another always sees two men, naked except a girdle, covered with hair, and of repulsive appearance; another sees red lions and lizards with red beaks.

This period varies in its exhibitions according to the richness of the imagination of the patient. On a slender groundwork drawn from the real life of the patient variations and extensions without number are developed. The attacks also are sometimes modified by vivid impressions received in the intervals between them.

Fig. 18.

Richer summarizes as follows the principal distinctive signs of the period of emotional attitudes:—

1. The emotional attitude always expresses a sentiment, an action, or a thought.

2. During the emotional attitude, the intellectual faculties are active; hallucination is always present.

3. During the emotional attitude, general and special sensibility are completely abolished, but the patient preserves her liberty of movements.

4. After the emotional attitude, the patient retains the memory of her hallucinations.

After the period of emotional attitudes or statuesque positions, properly speaking, it might be said that the hystero-epileptic attack is terminated. Consciousness returns, but only in part, and for a time the patient remains a prey to a delirium whose character varies. It is interwoven with hallucinations and accompanied sometimes by some troubles of movement. This delirium is regarded by Richer as constituting a fourth period, into which the patient passes before regaining her normal equilibrium.

The delirium is most often one of memory; it refers to the events which

have marked the life of the patient. It is sad and melancholy. The patient recounts her entire history and accompanies it with lamentations which sometimes have a thrilling accent of truth. One patient, for instance, nearly always ends her attacks with some such discourse as the following:—

"Ah! poor Gen.!—who can understand my grief! God only.—I ought not to receive him. He outrages me; I ought to be his wife, he makes me his mistress; but I love him too much. All is lost for me!"

All at once she straightens herself up, and gazes with eyes filled with tears as if at some one who approached her bed. She cries out again, menacing, reproaching, entreating to be given something which will cause her to die, etc. Sometimes her sad delirium takes on a frightful character. She works herself into a fury. The uproar and fury cease, as by enchantment, when, having extended her on her back, the ovary is compressed. Usually, however, her delirium is of a calmer character, and she begins a long history of her adventures.

The delirium of this fourth period may be concerned with subjects the most varied. It may be gay, sad, furious, religious, or obscene.

The delirium is mingled with hallucinations; voices are heard. Sometimes she sees personages who are known; sometimes the scenes are purely imaginary. After a period of melancholy delirium, one patient first sees a journeyman painter who often visited her when she was young; then a dog which murdered her brother; at other times she imagines that she puts her feet in water; or she sees black beasts, great rats, etc. Another patient is assailed by vipers and crows. A third sees toads, spiders, and rats.

Fig. 14.

One of the patients, whose attacks terminate by a phase which presents in a high degree the characters of the fourth period, at the end of the attack always presents the same acts and the same hallucinations. She rubs her hands and her eyes, and demands to have her sight restored. She kneels on her bed, her face against the sheets, and "blows the fire" (*souffle le feu*), Fig. 14; she cries "A cat! a cat!" She tumbles over.

She asks to drink, and drinks with the goblet between her teeth; she hears great bells and sees beasts.

During this fourth period the patients will sometimes make the most astounding statements and accusations. They will wrongfully charge theft, abuse, etc., upon others. They believe in the reality of their hallucinations, and, what is more important, they will sometimes persist in this belief after the attack is over. In this way we should probably account for the accusations which, in the times of sorcery particularly, unfortunates sometimes made against themselves, of commerce with the devil, or with innocent individuals.

General or partial contractures sometimes occur during this fourth period; but without loss of consciousness or absolute immobility.

The third and the fourth periods are sometimes confounded. The propriety of making two periods of them has been questioned. The boundaries between them are not always clearly marked. In reality, however, on close study, each will be found to possess characters sufficiently precise and distinctive to authorize their separation. In one period is a delirium of memory, in the other of action. In the fourth period the patient converses and recites; in the third she acts. Here it is mimicry, with various attitudes; there it is words, discourse. The hallucinations of the third are replaced by illusions in the fourth. The mobility of the conceptions of the fourth is opposed to the special character of the hallucinations of the third. The delirium of the fourth is varied and infinite. In the third the patient is completely distracted from the outside world; in the fourth she is not altogether inaccessible to external influences.

Not rarely muscular contractures or paralyses after hystero-epileptic attacks have existed several years, ceasing abruptly after a convulsive attack. Facts of this kind sometimes pass as miracles.

Urine, abundant and clear, is not infrequently passed at the end of an attack. Matthieu speaks of the "emission of a sort of vaginal mucus, so frequently observed at the end of attacks of hysteria, and which authors have considered as a sort of feminine spermatic fluid." (?)

A young woman, reported by Cerise, had several times during the day light attacks of hysteria, which terminated by an abundant salivation.

When the four periods described succeed each other in order they constitute a regular and complete attack of hystero-epilepsy. The epileptoid period lasts at least from one to three minutes. Usually it is clearly separated by a moment of calm from the second period, that of contortions and great movements, the duration of which is not quite equal to that of the epileptoid period. The line of demarcation is not as sharp between the emotional attitudes and the second period, the hallucination commencing sometimes during the latter. The period of emotional attitudes may last from five minutes to a quarter of an hour. These three periods, which constitute the attack proper, have altogether a duration of from a

quarter to half an hour. The fourth period, which is rather a sort of prolongation of the attack than a part of the attack itself, may be very short, a few minutes only, or it may be much prolonged.

An attack of hystero-epilepsy is rarely isolated. It is usually repeated several times, constituting the hystero-epileptic status (*l'état de mal hystéro-épileptique*). In the series of attacks sometimes the seizures commingle; one attack is not finished before another begins; sometimes the attacks are separated by an interval of lucidity of greater or less duration. The series may be prolonged for hours or days. Charcot has pointed out one very important character by which the hystero-epileptic can be separated from the epileptic state. In the *status epilepticus* the temperature is very rapidly elevated and to a high degree, the situation becoming more and more grave; on the contrary, in the protracted hystero-epileptic status the temperature scarcely passes the normal figure, and the concomitant general condition is not one to inspire inquietude. The attacks which compose a series are not all of equal duration nor perfectly alike. At first they are violent; towards the end they become extended, gaining in extent what they lose in intensity. Richer compares the patient to a music-box which possesses several different airs, but disposed in an invariable order.

By comparing the notes upon Case I. with the description given of the typical hystero-epileptic attack, I think it will be seen at a glance that the case is one of true hystero-epilepsy. The different periods, and even the phases, can be made out with but little difficulty. After a few moments of convulsive movements and irregular breathing, she was attacked with muscular tetanization, arrested respiration, and loss of consciousness. Tonic convulsions followed, and then immobilization in certain positions as represented in Figs. 2 and 3. Next came the clonic spasms and resolution. In the period of contortions the arched position is one more extreme than any represented by the illustrations of Bourneville and Regnard, although it is closely approximated by fig. 44, page 81, of Richer's work. After this position of opisthotonos had been taken a succession of springing and lifting movements occurred, probably corresponding to the phase of great movements. The period of emotional attitudes was very clearly represented, by the position assumed, the expression of countenance, and sometimes by the words uttered. Even the period of delirum was imperfectly represented by the mutterings of the patient, which were sometimes long continued after the attack.

In Case II. the spasmodic manifestations, both in their nature and method of succession, were like those of hystero-epilepsy, but the different periods and phases of an attack do not seem to have been so clearly defined. It appears to have been an acute attack occurring in a hysterical woman.

Richer applied to his studies of hystero-epilepsy the graphic methods of

Marey, making use of the latter's myographic apparatus. The drum was most frequently applied to the muscular mass on the front of the forearm. The apparatus registered the modifications in muscular contraction during the convulsive movements. This graphic method enabled a more thorough division of the periods into phases to be made. Many interesting traces are given.

From the large number of cases reported by Richer I have selected the following for translation, because, as this author says, it would be difficult to find one more complete and more confirmative of the description of hystero-epilepsy which has been given. By a study of this case, in connection with Case I., a very accurate idea of the typical hystero-epileptic attacks can be obtained.

CASE III.—Suzanne N., nineteen years old, small, a brunette, of nervous temperament, very irritable, has received some education, and is gifted with quick intelligence. For a long time subject to attacks of unjustifiable anger, to frights without cause, she has finished by having nervous crises, which, increasing little by little in gravity, have rendered her stay in her family intolerable and forced her parents to ask for her admission to the hospital of Salpêtrière, which she entered March 24, 1879.

She is totally anæsthetic and analgesic. The points of analgesia, irregularly distributed over the surface of the body, appear to predominate around the great articulations. The ovarian hyperæsthesia is double with a predominance on the left side. The patient, moreover, possesses two other hyperæsthetic points the excitation of which even lightly can determine the attacks. One of these hysterogenic points is on the left side below the breast. The other is on the posterior portion of the trunk at the boundary of the lumbar and dorsal regions of the left side, one finger's breadth to the left of the median line and three fingers' breadth below the inferior angle of the shoulder-blade.

A violent and unforeseen noise occasions an attack of catalepsy. She is very susceptible to the practice of hypnotization.

The hystero-epileptic attacks are remarkable for their regularity and their conformity to the type which has been described. They differ in one point of detail, very interesting and due to the predominant role which the imagination plays in the scenes of hallucination and of delirium of the last two periods.

Prodromes.—Suzanne is warned several days before the invasion of the attacks; she "feels them coming." Meanwhile a strong emotion can make the attacks explode all at once. When, as is most usual, they are preceded by prodromes, she recognizes what is coming. She must be stirring, fuming, she "feels jolly." At other times she has visions of animals; these are of spiders, rats, of monkeys which run on their four paws, and make faces. All these apparitions appear on her left, and pass away always in the same manner, that is, from the left to the right. The ovarian pain becomes very sharp; it is double, but with more intensity on the left. Soon she experiences what she calls false alarms. The painful phenomena of the hysterical aura develop spontaneously, to the point of making her believe that the attack is imminent, but the crisis holds back and miscarries. The *aura hysterica* presents a succession of points frequently observed. At the beginning is increase of ovarian pain, then precordial pain, palpitations, a sensation of suffocation and strangulation, finally, beatings in the temples, buzzing, whistling in the ears, obscuring of sight, and loss of consciousness if the attack occurs. The phenomena are present on both sides, but with marked predominance on the left. The hysterogenic zones, it will be recalled, are on the left side.

September 18, 1879.—Suzanne N. is in the middle of a grave attack at the time of the morning visit to the wards. According to the usual custom the attacks succeeded each other forming a series. We note several of these.

I.—(*a*) The epileptoid period is well marked but short. The tonic and the clonic phase can be very clearly distinguished.

(*b*) After some brief moments of calm, the patient puts herself into the arched position, and gives forth shrill outcries. She sinks down in the bed, becomes distorted, and finishes by placing herself in the arched position with her arms behind her back, and resting on her belly. She puts forth anew great cries.

(*c*) Her look becomes animated; she straightens herself to a half sitting position in bed; her physiognomy expresses terror; her right elbow is elevated as if to defend herself; she seems to threaten, but soon fright gains on her; she turns from one side to the other as if to escape the pursuit of an enemy.

Suddenly her expression changes: she looks fixedly above, whilst both joy and admiration are painted on her features. She lifts up her two hands in a sort of attitude of ecstasy. "Ah! how beautiful they are!" she says, with an accent of profound admiration. She executes with the head and arms a movement of well-timed balancing. "Ah! how pretty they are! Those women in the boat!—and those men lying at their feet! Mythology (*sic*) passes there. One sees nothing else clearly, all is dark around, but these are illuminated as by an electric light. Ah! how it rocks." She imitates with her arms and head the movements of the boat. All at once she cries out full of anguish: "Ah! they will fall!" She then covers her face with her hands, cries out with terror, and hides her head in the pillow.

(*d*) Soon she sits up again in bed and begins to talk. She has no more hallucinations. "Oh! certainly, I will be an actress—so—they shall not take from me the idea. I will enter the conservatory, I will study two years. Then I will go on the stage, I will declaim, I will be like Sarah Bernhardt. 'This light which I see again still breaks my heart!'" (She delivers this phrase in a theatrical tone.) "It is no more difficult than this—When we speak, believe what we say, and that is all."

All at once a new attack comes on.

II.—10.10. (*a*) The epileptoid period lasts one minute. The tonic phase takes place with extension; the clonic movements are very well shown; froth flows from the lips.

(*b*) The patient cries out with rage and is agitated. The arched position follows, while the belly undergoes rapid undulations. The patient turns from one side to the other, performing a sort of rolling movement. She evinces rage, and cries. She assumes the reversed arched position on the belly. The patient is contorted and rolls over several times.

(*c*) She now gets up on her knees, her visage expressing horror: "Traitor!—It is true. What is that which he comes here to do?" She becomes calm little by little, assumes a desolate air, laughs, lies down, sinks into her bed, and turns herself from one side to the other.

She sits down, balancing the arms and the head. Her expression is smiling; her gaze is fixed on high. "Oh! it is pretty; it flies away." Suddenly her features contract and breathe affright; her eyes are directed on high and to the right. She cries out with terror; she struggles; her eyes always fixed in the same direction. Just as promptly as she became frightened, the scene again becomes one of calmness and mirth. "Oh! it is pretty." She seems to follow with her gaze something that flies in the air. "The sportsmen must bring them down." She seeks her bed, scratches. "Oh! oh! it is droll, ah! ah!"

10.17. A new attack supervenes.

III.—(*a*) The epileptoid period presents the same characters as in the preceding attacks.

(*b*) Arched position with undulation of the belly. Great movements. Cries. Arched position again; the patient rests on the feet and head; then all at once she throws herself on her belly, in the reversed arched position. Cries, struggling, throwing herself from right to left.

(*c*) Attitude of terror; the patient is on her knees, inclined forwards; "Ah! all these monkeys!—Mamma—I do not wish any one to strike me.—(She struggles.) All these monkeys!—(Gesture of menace.) They wish to kill me. So much the better.—Oh! all this blood! well done."

10.22. Ovarian pressure brings back consciousness, which disappears as soon as this manœuvre ceases. Contrary to that which generally happens, she does not resume the attack from the beginning; she continues. A new emotional

position is reproduced; she is all admiration; she is on her bed, the hands joined: "Oh! how well they dance! They are light and graceful! One would say they are nymphs!" The attack is suspended by ovarian pressure. When the compression is stopped she retains consciousness; but soon a new attack comes on spontaneously.

IV.—(*a*) The epileptoid period (tonic and clonic phase, frothing) arrested in the middle of the clonic phase by ovarian pressure. The patient recovers her senses. Pressure on the mammary hyperæsthetic point provokes a new epileptoid period, which we are not able to arrest by a new excitation at the same point.

(*b*) Cries. Arched positions of several varieties. These different attitudes succeed each other abruptly, and only last a few seconds. Cries; movements of rolling. Rage, bites the pillow.

(*c*) 10.27. Attitude of terror; exclaims several times "Ah! ah!" with fear. Directly succeeds a gay attitude, which does not last long. "She is unfortunate! Poor woman! Finally, it is not true; they say meanwhile that it is true." She then declaims these verses of Alfred de Musset:—

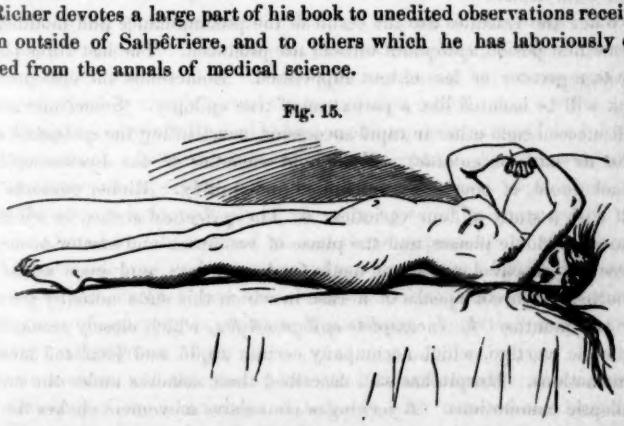
"Vous n'avez jamais vu le spectre de la Faim
Soulever en chantant les draps de votre couche,
Et, de sa lèvre blême effleurant votre bouche
Demander un baiser pour un morceau de pain."

"All these women there, how they mock the poor men! As for me, I will never mock them; no, never! One does not know how they came there. I have not the right to say anything, that would bring scorn on my own family. I am not the judge of the acts of my parents. The children must bear the consequences. I will be an actress. Certainly, I wish to make myself an actress. (She changes her mind.) No, hold, I will become religious. To adore the good God! I will die very young. I will see God—I will go to Heaven." She looks towards the right side of her bed. "I have a guardian angel, I see him! Oh! how beautiful he is!" She remains in contemplation, joins her hands and seems to recite some prayers, as her lips move lightly. Her expression is radiant; her eyes, wide open, are wet with tears. "I wish that he would speak to me—Oh! no, I will not become an actress."

Scarcely had she uttered this phrase when a new attack comes on; and so the series continues.

Richer devotes a large part of his book to unedited observations received from outside of Salpêtriere, and to others which he has laboriously collected from the annals of medical science.

Fig. 15.



In Fig. 15 we have a beautiful illustration of one of the positions assumed by a hystero-epileptic, from Dr. Allan McLane Hamilton's Treatise on *Nervous Diseases*.

The patient, æt. 18, represented in the figure had suffered from hystero-epileptic attacks since the beginning of the menstrual epoch. Usually she had several severe but distinct epileptic seizures, and afterwards a hystero-epileptic paroxysm. The muscles of her back were rigidly contracted in opisthotonos. Her arms were drawn over her chest, and her forearms slightly flexed and crossing each other. Her thumbs were bent in and covered by her other fingers, which were rigidly flexed. Her toes were also flexed, and her right foot presented the appearance called by Charcot "le pied bot hystérique," or hysterical club-foot.

Hystero-epilepsy in the male is very rare, but does occur. Richer records, from the practice of Charcot, a case of convulsive hysteria developed in a lad of twelve years.

I have tried to give a clear view of the regular or typical hystero-epileptic attack as described by the French authors. Hystero-epilepsy of imperfectly developed or irregular type is, however, even in France, a common affection. Varieties of grave hysteria must be studied, and they are best studied in the light of the knowledge of the great attack.

According to Charcot the attack of hystero-epilepsy can be modified according to two principal methods: 1st. By extension or predominance of one period at the expense of the others, which become lessened or even effaced, thus producing, *a*, the *epileptoid attack; b, the demoniacal attack; c, the attack of ecstasy; d, the attack of delirium.* 2d. By the blending of elements foreign to the fundamental constitution of the attack, such, for instance, as *somnambulism*, *lethargy*, and *catalepsy*.

I can scarcely do more than glance at the principal varieties of the grave hysterical attack.

When the varieties are the result of the predominance and modification of the first period, *epileptoid attacks* are produced. The last three periods are to a greater or less extent suppressed. Sometimes the epileptoid attack will be isolated like a paroxysm of true epilepsy. Sometimes attacks will succeed each other in rapid succession, constituting the *epileptoid states* (*état de mal épileptoide*). Epileptoid varieties of the hystero-epileptic attack could, of course, be multiplied indefinitely. Richer contents himself with a study of four varieties: *a.* The *epileptoid status*, in which the tonic and clonic phases, and the phase of resolution and stertor occur, and these are repeated again and again for hours, days, and even weeks and months. Charcot speaks of a case in which this state actually persisted for two months. *b. Incomplete epileptoid fits*, which closely resemble the epileptic vertigo, which accompany certain rapid and localized muscular contractions. Herpin has well described these seizures under the name of epileptic commotions. A jerking or convulsive movement shakes the body like an electric shock; the trunk may be bent, the arms elevated, or the legs flexed, or a single limb or the face or head may be jerked. Sometimes the patients fall, more frequently they do not. Sometimes sight is

dimmed; intelligence and consciousness sometimes are and sometimes are not affected. A cry, dyspnœa, nausea, precordial pain, and palpitations, sometimes occur. To the above may be added such hysterical phenomena, as ovaralgia, strangulation, palpitations, whistlings in the ears, beatings in the temples, swelling of the neck, tympanites, borborygmi, etc. The epileptoid commotion may repeat itself in a series of seizures. *c. Attacks of visceral spasm.* Visceral spasm may be so great, as shown by hiccough, lifting of the chest, contraction of the muscles of the neck, and terribly irregular respiration, that the patient will appear to be dying; but ovarian compression interrupts the attack, and a little chloroform causes it to cease entirely. The appearance of great gravity is far from being real. *d. Epileptoid attacks with general and permanent contracture.* A limb or limbs, or the face may be violently contracted, with or without loss of consciousness. Ovarian pain, thoracic oppression, sensations of strangulation, palpitations, cyanosis of the face, etc., may be present. Sometimes the general contraction is accompanied by loss of consciousness and a lethargic sleep which may be prolonged for hours.

Attacks which have been well called *demoniacal* are sometimes produced by modifications of the contortions of the second period. Here are the wildest phenomena of movement, frightful contortions and contractions, with grimaces and cries of fury and rage. Ler—, one of the famous cases of Charcot, is a victim of these demoniacal attacks.

Sometimes, instead of the illogical positions and contortions being wildly exaggerated, the great movements of the second period show a violence beyond description, requiring half a dozen attendants perhaps, to prevent the patient from injuring herself.

Modifications of the period of emotional attitudes, with partial or complete suppression of the other periods, produce attacks of ecstasy. Ecstasy may be found outside of hysterical attacks; but a hysterical ecstasy is observed which is simply a modification of this period.

Attacks of delirium may stand alone as the representative of the hystero-epileptic attack. Sometimes these attacks accompany phenomena which belong to the other periods of the grave hysterical attack; sometimes they show themselves independently of all other hysterical phenomena.

It was found by Charcot and his associates and assistants, that many of the hystero-epileptics under various influences, such as a bright light, sonorous vibrations, fixity of gaze, compression of the eyeballs, and passes, were susceptible of entering into states of catalepsy, suggestion or imitation, lethargy, and somnambulism.

Some curious and interesting varieties of hystero-epilepsy result from the blending of the phenomena of lethargy with some of the hysterical manifestations already described. Numerous instances of simple lethargy or prolonged sleep in hysterical cases are on record. Landouzy has reported an interesting instance of lethargy produced by the application of a mag-

net to a patient suffering from hysteria major. The attacks of hysterical sleep are often preceded by convulsive phenomena; and, according to Briquet, are often ushered in by epileptoid signs, such as whistling inspiration, movements of deglutition, frothing, and transient rigidity of the limbs. Richer reports a remarkable case of Pfendler's of Vienna, in which a young girl, after a series of violent hysterical attacks, fell apparently dead. Preparations were made to bury her, when she was found to be living, having been in a state of lethargy. Among cases observed in Salpêtrière the duration of lethargy has been from two to eight days. Sometimes in cases of grave hysteria attacks of lethargy complicated with general or partial contractures and epileptoid phenomena have been observed. The presence of neuro-muscular hyperexcitability is of diagnostic value in determining the nature of such cases; if present we have probably to deal with the phenomena of hysterical lethargy. This symptom may, of course, pass unperceived.

In hystero-epilepsy attacks of lethargy are sometimes complicated with cataleptiform phenomena. The eyes are shut, the lids winking; partial contracture or general rigidity comes on; the limb keeps the position in which it is placed, although sometimes it is necessary to hold it a few moments before abandoning it to itself.

The catalepsy is often partial. Frictions restore muscular resolution. The condition is not one of true catalepsy, but of the cataleptiform state of lethargy.

Sometimes, again, varieties of hystero-epilepsy are produced by the admixture of the phenomena of catalepsy or somnambulism. It is not necessary to believe in the absolute identity of the nature of catalepsy and hysteria. It seems rational to admit, according to Richer, that we may have a hystero-catalepsy without true epilepsy, just as hystero-epilepsy may contain nothing of true epilepsy. Catalepsy and somnambulism in cases of hytsero-epilepsy are sometimes complicated with emotional attitudes; sometimes they are accompanied by phenomena pertaining to different periods of the hystero-epileptic attack; sometimes they appear under the form of distinct seizures in a patient who, at other times, has convulsive attacks, or simply other signs of hysteria. Many remarkable cases illustrating these statements are put on record by Richer.

Between the delirium of grave hysteria and the cerebral affections caused by the absorption of various toxic substances, such as alcohol, absinthe, and haschisch, striking analogies have been discovered.

Besides the great attacks and their numerous varieties, grave hysteria counts among its manifestations phenomena which merit the name of permanent symptoms. The most striking of these are the troubles of sensibility, such as anæsthesia, hyperæsthesia, etc., the affections of motility, such as paralysis, contracture, common chorea, and rhythmical chorea. They also comprise disorders of secretion, such as anuria, vomiting, and

hæmatidrosis; troubles of nutrition, such as result from prolonged abstinence; and disturbances of circulation, such as flushings, urticaria, stigmata or ecchymoses, etc.

The presence of anæsthesia in cases of hysteria has been well known for many years. In hystero-epilepsy anæsthesia is the rule. It is distributed irregularly over the surface of the body; sometimes limited to a point of the trunk or to a limb; most frequently in grave hysteria it occupies one-half of the body (hemianæsthesia). It may extend over the entire skin. Sometimes we have simply *analgesia*, which is the first degree of loss of sensibility, in which the sensation of pinching or pricking is perceived, but is not painful. The anæsthesia at times extends to the muscles and even to the bones. Many hysterical patients are anæsthetic without knowing it. Charcot has particularly drawn attention to hysterical hemianæsthesia. The head, the limbs, and the trunk of one side are all affected. All the modes of common sensibility, to touch, pain, and temperature, and all the organs of sense, of sight, hearing, smell, and taste, are affected. The hemianæsthesia is always accompanied by some muscular enfeeblement. It more often has its seat on the left side, which is most frequently the seat of ovarian hyperæsthesia.

Hysterical hemianæsthesia is habitually accompanied by general or partial achromatopsia, a form of colour-blindness. Hysterical achromatopsia differs from Daltonism. The patient suffering from Daltonism will take one colour for another; but in hysterical achromatopsy the notion of colour is lost completely. The colours disappear always in a known order from the centre to the periphery of the field. The visual field, it is well known, is physiologically more extended for some colours than for others.

Hysterical anæsthesia undergoes spontaneously certain variations in intensity. This anæsthesia and most of the permanent symptoms of hystero-epilepsy are also readily modified by certain agents called *æsthesiogenic agents*, which act on the surface of the body. Among these are applications of metallic plates, subcutaneous injections of metallic salts, and various electric applications. M. Vigouroux considers static electricity as the most powerful of all æsthesiogenic agents. Galvanic and faradic currents, bar magnets, electro-magnets, solenoids, vibrations of sonorous bodies, ice, cold and hot water, sinapisms, blisters, etc., all have been proved to have æsthesiogenic qualities. The hysterical anæsthesia will disappear momentarily under the influence of that æsthesiogenic agent to which the patient is susceptible, which is found by trial. When the sensibility returns on one side, it often disappears in the same region of the opposite side. This is the phenomenon of *transfer*. Sometimes anæsthesia returns to the first side, again disappearing on the other, and this is repeated again and again, constituting what Charcot has called *consecutive oscillation*.

The æsthesiogenic agents act on special sensibility in the same fashion

as on general sensibility. Under their influence the organs of special sense recover their functions, and the phenomena of transfer and consecutive oscillations take place.

The return of sensibility which is usually momentary can be rendered permanent by maintaining in contact with the skin which has been rendered sensitive a plate of metal which is neutral, that is, which is incapable of producing in this case metalloscopic phenomena (Vigouroux).

In a patient not actually anæsthetic, but in whom the hysterical diathesis exists, anæsthesia can be produced by various applications, thus giving a diagnostic and prognostic value to these æsthesiogenic agents.

Hysterical patients in general become refractory to the æsthesiogenic applications just before and after a crisis, and sometimes when affected by strong emotions. Occasionally they cease to be impressionable to their usual metal, but become sensible to others. Hysterical anæsthesia is probably of cerebral origin.

Marked enfeeblement of muscular power very constantly accompanies the anæsthesia of the limbs in cases of hystero-epilepsy. Hysterical hemiplegia or hemiparesis is very common. It is three times more frequent upon the left side than upon the right.

Paralysis is five times more frequent in the lower than in the upper limbs. It very rarely attacks the muscles of the face. (Briquet and Landouzy.) The paralysis may affect the constrictor muscles of the pharynx and œsophagus, the muscles of the larynx, of the bladder and rectum.

Hysterical hemiplegia enters into the category designated by Brissaud under the name of hemiplegia with latent contracture.

Exaggeration of tendon reflexes is a frequent phenomenon in hysteria.

Contracture, partial or general, as has been shown, is often met with before, during, or after the hystero-epileptic attack. Permanent hysterical contracture is, however, more properly a symptom of non-convulsive hysteria. It has been well studied by Charcot, Bourneville, and Voulet.

In hysterical patients these contractures can be brought on by a variety of methods, as by mechanical excitation of muscles, by the branches of a tuning-fork, put in vibration and made to traverse the skin; by strong tractions on a paretic limb; by a violent muscular effort on the part of the patient; by local faradization; by the applications of magnets; by traumatisms. Hysterical contracture is due to a special dynamic modification of medullary centres.

Among the hysterical affections of motility hysterical rhythmical chorea is one of the most interesting. In this form of chorea the involuntary movements are systematized into a certain order, so as to produce in the parts of the body which are affected determinate movements which always repeat themselves with the same characters. The movements which are seen in these isolated cases, a number of which have been reported, are

strikingly analogous to the rhythmical movements, as those of "salutation," which often occur in the second period of the hystero-epileptic attack. Rhythmical chorea should undoubtedly be ranged among the manifestations of grave hysteria. An account of an interesting case of this kind is given in a lecture by Professor H. C. Wood, reported by me in the *Philadelphia Medical Times* for February 26, 1881.

Hystero-epileptics are often suspected of simulation. Richer refers to many facts which seem to throw out conclusively the idea of simulation. Among these are the results obtained by the æsthesiogenic agents, the experiments in hypnotism, where many of the results produced could not be simulated.

Some English authors, and among them notably the physiologist Carpenter, have endeavoured to find the explanation of the results obtained by the æsthesiogenic agents in a special action of the moral on the physical nature which they designate "expectant attention." While the reality of the action of expectant attention in certain cases will not be denied, it cannot be invoked to explain satisfactorily all the phenomena. The patients are not aware of the results sought, which, indeed, in some cases are contrary to the expectations of the observer himself.

Richer gives a summary of the diagnostic signs between true hystero-epilepsy and true epilepsy.

(*a*) Arrest of the attacks by ovarian compression, by the application of inverted electric currents, and by irritation of the hysterogenic zones, can be brought about in hystero-epilepsy and not in epilepsy.

(*b*) The course of the temperature in the epileptic state and in the hystero-epileptic state differs. This point of capital importance has been indicated by Charcot and Bourneville. An elevated temperature, of 40° C. (104° F.) or more, belongs to the epileptic state; while in hystero-epilepsy the temperature remains nearly normal, and only under exceptional circumstances passes above 38° C. (100⅖° F.).

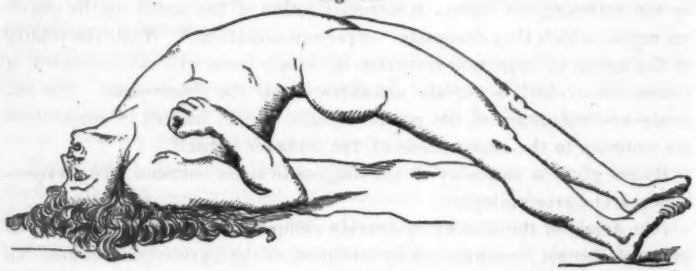
(*c*) The mode of action of potassium bromide, a drug frequently used in both affections, favours the opinion that the two diseases are distinct. Potassium bromide, so salutary in epilepsy, is without efficacy in hystero-epilepsy.

The service of Charcot at Salpêtrière contains a number of types of epileptic insanity truly startling. These form a strong contrast to the "veterans" of hystero-epilepsy.

The hysterical or hystero-epileptic contortion need not be confounded with the opisthotonos of tetanus. In Fig. 16 is a representation of the opisthotonos of tetanus taken from Sir Charles Bell's *Anatomy and Physiology of Expression as connected with the Fine Arts.* It is a sketch of a soldier, struck with opisthotonos after having been wounded in the head, in connection with which I will briefly call attention to the points of differential diagnosis as given by Richer, and which have been confirmed by

my own observations. In the opisthotonos of tetanus, the contraction of the face, and the peculiar grin, are distinguishing points, and are well represented in Bell's sketch. In the hysterical arched position, while the jaws may be strongly forced together, the features are most often without expression. The contracture of the face and the distortion of the features will be met with more often in the other varieties of contortion. The curvature of the trunk differs but little in the two cases, but the abdominal depression, observed in the sketch of Bell, is far removed from the tympanites present in the majority of the hystero-epileptics. In the tetanic cases, the patients rest only on the heels, while in the hysterical cases the knees are slightly flexed, and the patients are usually supported on the bed by the soles of the feet.

Fig. 16.



The general health of hystero-epileptics does not appear to suffer. The grave attack, even the long series of attacks, often leave only a state of insignificant lassitude, not at all in relation with the immense expenditure of muscular force. The duration of the affection may be very long, commencing before the epoch of menstruation and prolonging itself long after the menopause. They remain always in about the same mental condition. Except the whimsical frame of mind well known to belong to the hysterical temperament, the intellect does not undergo any notable alteration.

The prognosis of hystero-epilepsy is far from being as grave as that of epilepsy, a fact which makes still clearer the distinction between the two diseases.

Esquirol, Morel, Reynolds, and every one who has written about epilepsy, or had any experience with it, is fully aware of the permanent intellectual troubles which develop among epileptics.

Richer discusses the treatment of hystero-epilepsy under the two heads of (1) the treatment of the attacks; and (2) the treatment of the disease.

Inhalations of chloroform, sometimes inhalations of ether, and the subcutaneous injections of the chlorohydrate of morphia will make the convulsions cease, bring on resolution, and plunge the patient into a sleep, followed often by a special delirium. At *La Salpêtrière*, Bourneville studied on a vast scale the action of nitrite of amyl on the attacks. The convulsions

are immediately stopped, and, more than this, the use of the drug diminishes the number of the fits.

Applications of ice on the ovarian region are impracticable during the attack, but employed during the prodromes, they diminish their intensity, and delay or even banish completely the convulsions. The ice, above all, acts best on the visceral spasms, hiccoughs, movements of the belly, etc., which torment the hysterics in the intervals of the attacks.

The continuous or galvanic current has been employed to arrest the attacks. Richer speaks of two methods employed with success by himself and Regnard, in the service of Charcot. (1) The patient being in the attack, one rheophore is applied by means of bands to the forehead, the other anywhere upon the body, a leg or the ovarian region being often selected. From five to ten or fifteen elements of the apparatus of Trouve are used. The current is passed in either direction continuously. It diminishes the violence of the attacks, and during the hystero-epileptic status puts off the return of the fits. (2) The electrodes being disposed as above described, the operator waits until an attack comes on, and then inverts the current by means of a commutator. The attack is at once arrested. The patient awakens astonished, carries her hand to the head, and completely regains consciousness. In the worst cases it may be necessary to repeat the inversions two or three times to bring about the result. Richer and Regnard usually employed forty or fifty elements of the apparatus of Trouve; evidently, I should say, an apparatus with weaker elements than those commonly employed in this country. Forty elements might be dangerous if applied to the head in this way.

Compression of the ovary on the side of the seat of the lesion ordinarily will immediately arrest the convulsions. Charcot has restored this method of treatment of hysterical attacks. The patient is extended horizontally, and the physician plunges the closed fist into the iliac fossa, often using great force to overcome the muscular resistance.

Poiner has invented an apparatus called a "compressor of the ovaries," which can sometimes be used with advantage.

Under the influence of sonorous vibrations, as from a diapason or gong, attacks of catalepsy, or even the grave hysterical attack, have been known to supervene. Richer gives some interesting historical notes on the utilization of music in medicine from the time of Pythagoras to the present. Among the hystero-epileptics sonorous vibrations were found to be without result during the great attacks, even among those who were easily impressed outside of the crisis. This simply proves that the general anæsthesia during the fit extends also to special sensibility. The influence of music on the hysterical seizures limits itself to the convulsive attacks without loss of consciousness, and to those varieties in which special sensibility sometimes persists, as in catalepsy, lethargy, and somnambulism.

When we come to consider the treatment of the disease hystero-epi-

lepsy, the practical importance of the distinction between this affection and true epilepsy becomes at once apparent. Cures of hystero-epilepsy are not rare. The original cases here reported have both, to all appearances, recovered. Grave hysteria is sometimes cured spontaneously, either by gradual disappearance with the progress of age, or suddenly, because of some violent impression, or under the influence of unknown causes. One of the worst cases in the service of Charcot has shown a gradual diminution of the hystero-epileptic manifestations with the advance of age. In another case, under the influence of strong moral impression, the disease disappeared at a stroke. The affection, however, should not be abandoned to nature, as treatment is often of great value.

I will give some of the most successful methods of treatment adopted in France.

The hydrotherapeutic method of treatment has been found of the greatest service. In carrying it out in private practice the patient should be separated as far as possible from her habitual surroundings and advisers, above all from her parents and family, whose over-solicitude often keeps up the conditions which they seek to combat. This can be best accomplished by placing the patient in a hydrotherapeutic establishment. Hydrotherapy must be methodically employed by experienced hands. A number of the cases cited by Richer were cured at hydrotherapeutic institutions.

Limited success has followed the use of metallotherapy, the method introduced by Burq, and which became widely known to the profession through the lectures of Charcot. In brief, this method of treatment is as follows: After having determined by a series of experiments the metal to which the patient is sensitive, plates of this metal may be applied to the surface of the body, which constitutes *external* metallotherapy; or the metal in the form of powder (as reduced iron), or an oxide or salt of the metal, may be administered, this method being known as *internal* metallotherapy. Curative effects have been obtained in this way. One of the patients reported by Richer was cured by the gold treatment.

Besides metallic plates the same results may be obtained with other physical agents, to which, as we have seen, have been given the name of æsthesiogenic agents. Among these are feeble electric currents, vibrations of a tuning-fork, magnets, static electricity, etc.

A feeble current from a constant or galvanic battery applied to the hysterogenic regions, or even to other parts of the body, will sometimes prove of great service.

Charcot and Vigouroux cured one case affected with hysterical contractures of the left arm by repeated applications of a magnet to the right or healthy arm. Debove, by prolonged bilateral applications of magnets, has obtained success in the hemianæsthesias and hemiplegias which accompany cutaneous anæsthesia, when the nervous troubles depend on

hysteria, alcoholism, saturnism, or various cerebral lesions. Dr. Carlo Maggiorani, Professor in the University at Rome, in two works, one published at Milan in 1869, and the other a few years later, studied the physiological action of the magnet, and laid down the first rules for its employment in therapeutics.

Static electricity has recently been again brought into prominence in the treatment of grave hysteria, chiefly through the labours of Dr. Romain Vigouroux who has special charge of electrotherapy in the clinical laboratory of Charcot at Salpêtrière. Vigouroux ranks static electricity among the æsthesiogenic agents, and believes that it possesses a greater power than metallic plates and other æsthesiogenic agents in general.

With reference to drugs, I will simply say that we should resort to those which have a tonic influence upon the nervous system. Potassium bromide, as has already been indicated, is not efficacious. More is to be hoped for from tonics and antispasmodics, such as valerian, iron, salts of silver, zinc, copper, sodium and gold chloride, etc. Good hygienic influences, moral, mental, and physical, are of the utmost importance.

Hystero-epilepsy undoubtedly played a great part in the great convulsive epidemics which desolated the middle ages. Calmeil, Littré, Valentiner, Charcot, Richer, and others, have shown conclusively the analogies which exist between the ancient convulsive epidemics—the epidemic chorea of the middle ages, the epidemics of demoniacal possession, the convulsionnaires, and the ecstatics—and the hystero-epilepsy of the present day.

ARTICLE VII.

THE TREATMENT OF SCARS OF THE FACE INVOLVING THE EYELIDS DIRECTLY OR INDIRECTLY.[1]

By CHARLES STEDMAN BULL, A.M., M.D., Lecturer on Ophthalmology and Otology in the Bellevue Hospital Medical College; Surgeon to the New York Eye and Ear Infirmary; Ophthalmic Surgeon to St. Mary's Free Hospital for Children, and to the Nursery and Child's Hospital.

SCARS upon the face, in the vicinity of or directly involving the eyelids, have long been a subject of interest to ophthalmic surgeons; and various have been the attempts to remedy the defects produced by the contraction subsequently occurring in them. The main interest has apparently centred in those scars, more or less extensive, due to burns or to extensive laceration and destruction of soft parts from wounds, chiefly gunshot, like those received in battle. The same or an equal degree of interest does not seem to have been attached to those depressed scars due to long-continued glandular abscesses, or to chronic bone-disease with subsequent

[1] Read before the American Ophthalmological Society, Newport, July, 1881.

exfoliation of bone. The object to be gained by operative interference in these cases is twofold, viz., to remedy an unpleasant deformity, and to protect the eye from injury by restoration of one or both eyelids, in whole or in part. Whether the case be one of partial or complete ectropium of one or both lids, caused by the cicatrization following a burn, or of partial or complete destruction of one or both lids, the operation deemed necessary is some form of blepharoplasty, either by sliding flaps or the transplantation of a flap with pedicle from some neighbouring region, or by the process of grafting without pedicle by the transplantation of skin, in numerous small pieces or in one large graft, from some distant region. All of these various operations occasionally fail in their ultimate results, and this from no fault in their technical performance. No surgeon, however experienced, in his desire to correct a deformity, can ever trust implicitly in the persistence of a large scar, and he should be very cautious in attempting to remove the effects of contracting bands of tissue by operation, for every new incision that is made is eventually filled up by the formation of this same granulation tissue, in which the same contracting process goes on as in the original scar. The new-formed granulation tissue is gradually changed into fibrous connective tissue, and then becomes true cicatricial tissue, made up of bundles of connective-tissue fibres, as are seen in tendons and fibrous membranes. This conversion of the exudation cells of granulation tissue into filaments of cicatricial tissue, ending in contraction, seems to be very much of a mechanical process. We all recognize the fact that the changes taking place in a cicatrix do not cease with its formation, for the gradual contraction continues for a considerable, though very variable, period of time, and does not attain its maximum until long after the completion of the cicatrization. In view of these facts it has seemed to the writer that operations for blepharoplasty are sometimes undertaken too early, before cicatricial contraction has ceased, and that in some of the cases at least, the lack of ultimate success may be thus explained. Another point to be remembered is that the contraction in scars from burns is greater than from any other cause, and the contracting process lasts longer. Still another point to be remembered is that the degree of contraction, though largely dependent on the nature of the agent that caused it and upon the extent of its destructive action, also depends somewhat upon the seat of the scar. If it is in a region where the skin is naturally tense, as over bony prominences, the contraction will be slighter than where the skin is naturally loose. A scar over the superior orbital margin, or on the side of the nose, or over the zygoma, will contract less than one over the lower orbital margin or on the cheek. But on the other hand, in injuries or burns of those regions where the skin is naturally tense, the resulting cicatrix is in most cases immovable, in this regard being almost characteristic. In superficial caries with an external opening, when the bone-disease is arrested and the necrosed por-

tions have been detached and cast off, repair goes on in the usual way by the formation of granulation tissue, which is subsequently converted into fibrous tissue, becomes continuous with the bone or periosteum at the seat of the original disease, contracts and possibly ossifies, and thus the depressed cicatrix is caused. This is well described by Dr. D. Hayes Agnew in his late work on "Surgery."

We should not be too hasty in operating for deformities about the lids produced by the scars resulting from bone disease. For very often these scars break down from pressure or tension, or from some constitutional cause such as struma, or alcoholism, or scurvy. Such spurious cicatrization is not infrequently seen over fistulous openings from bone caries; the surface of the scar retains a pale blue hue sometimes for a long period, and conceals a granulating tissue below. Such scars never attain the vitality of older structures, and the larger they are, the less vitality as a rule do they possess. Any operative procedure to relieve the deformity accompanying such a scar would be almost certain to fail, whether by blepharoplasty with sliding flaps or with a pedicle, or by grafting without a pedicle. Excision of the entire scar, and if bone disease be present, removal of the affected portion by forceps and scraper or chisel, must precede any successful attempt at blepharoplasty, if a solid cicatrization is to be obtained.

Certain observations of the writer upon the natural course of development and transformation in scars of the face involving the lids, directly or indirectly, have led him to think that the natural process of change may be assisted and perhaps hastened by a combination of massage and traction, and thus the parts made more movable and put into a better condition for the performance of any blepharoplastic operation, the chances of the success of which are thereby enhanced. We know that in time the tissue of a scar assimilates more and more to the structure of a part, and its deep attachments become more movable. The scar which at first is thin, bluish and shining, and composed of undeveloped fibrous tissue, becomes white and depressed, and its structure comes very slowly to resemble that of the part where it is situated, though of course it never becomes true skin. The loosening of such scars from their deep attachments is due to a slow absorption of certain tissue elements and the formation of a loose network of connective tissue, more or less elastic and pliable, at the base of the scar. Great changes occur in this regard in course of time, but as Hayes Agnew says, external agents such as rubbing and kneading the parts, or massage, and even soaking and steaming the parts, are useful in hastening the process of interstitial absorption. We can readily see that the act of massage, by pressure on plastic deposits, causes an absorption of a certain amount of intercellular material, and thus the texture at the base becomes more open. Persistent rubbing and kneading of scars of the face, both those due to burns and those resulting

from bone caries, as preparatory to blepharoplasty, have in a number of instances in the writer's experience yielded most excellent results. Adhesions of scars, slight or extensive, to the subjacent parts, have been slowly, cautiously, and painlessly detached, and a gradual absorption of the firm material in the dense part of the scar has been brought about. So considerable has been the result obtained in some cases, that the writer has come to regard this gradual extension and loosening as an important part of the treatment in these cases. It is astonishing how soft and pliable the seams in these scars become under this treatment, and this pliability and elongation of the cicatrix are probably permanent.

The depressed scars due to bone disease, in which, after the casting off of the sequestrum, the fistulous sinus has closed, and the scar has become depressed and firmly adherent to the bone or periosteum, generally prove intractable to this method of treatment by massage. In these cases it will be necessary to divide the adhesions subcutaneously and then keep up motion in the parts by rubbing, until all danger of re-adhesion of the old attachments has passed. This operation has been advocated by Mr. Wm. Adams of England, who has practised it in a number of cases with success (see *British Medical Journal*, April 29, 1876). He describes it as an operation for the obliteration of depressed scars after glandular abscesses or exfoliation of bone. The operation consists first in subcutaneously dividing all the deep adhesions of the cicatrix by a tenotomy knife, introduced in healthy tissue a little beyond the margin of the cicatrix and carried down to its base. Then the depressed cicatrix is carefully and thoroughly elevated, lifting it up as it were so that the cicatricial tissue remains prominently raised, and the cicatrix maintained in its elevated position for several days by passing two hare-lip pins or stout needles through the base at right angles to each other. The needles or pins are generally removed on the fourth day, and the cicatricial tissue, somewhat swollen and infiltrated, is allowed gradually to subside to the proper level of the surrounding skin. Adams thought that after subcutaneously dividing all the deep adhesions of the cicatrix, elevating the cicatricial tissue and retaining it so raised for a few days, the depression would become filled up by inflammatory infiltration, so that the scar could not again sink below the level of the surrounding skin, the depression would thus become obliterated and all the adhesions of the cicatrix would be effectually removed. The doubtful point is whether, in the course of time, absorption and reconstraction of the inflammatory lymph would take place, so that the depression would return. After the operation the cicatricial tissue always loses its shiny membranous character, and becomes looser and of an opaque white colour.

So far this method of treatment of depressed, adherent scars from bone-caries has been employed by the writer in but three cases, but in all with satisfactory success.

One was for complete eversion of the lower lid by a broad depressed cicatrix firmly adherent to the superior maxilla below the orbital margin. The original trouble was probably extensive caries of the bone from scrofulous disease. After the loosening of the scar had been effected, and subsequent massage treatment had been carried on for four weeks, the lid was inverted, and the space opened by the incision along the line of the scar through healthy tissue was filled in the ordinary way by transplantation of a flap of skin with pedicle from the temple.

The second case was also one of complete eversion of the lower lid from the same cause, the original injury having been a pistol-shot wound. The adhesions here were not so broad as in the first case. The subsequent method of treatment was the same.

The third case was one of almost complete eversion of the upper lid, produced by a long and somewhat broad scar on the forehead, just above the eyebrow, the cicatrix being markedly depressed and firmly adherent throughout its whole length to the bone. There had been quite extensive destruction of bone from a severe blow received many years before. In this case also the same steps were carried out, and the resulting gap from the incision filled by transplantation of a flap from high up on the forehead. As before stated, the ultimate result was excellent in all the cases.

ARTICLE VIII.

SUPPLEMENT TO A CASE OF PAINFUL NEUROMA OF THE SKIN. By LOUIS A. DUHRING, M.D., Professor of Skin Diseases in the Hospital of the University of Pennsylvania.

IN the number for October, 1873, of the *American Journal of the Medical Sciences*, I described a remarkable case of painful neuroma of the skin. The patient at that time had already been under my observation six years. A drawing showing the cutaneous lesions and their distribution accompanied this article, which, together with the letter-press, gave a satisfactory idea of the disease. It was there remarked that the case was probably unique. Its resemblance to the better-known painful subcutaneous tubercle, originally described by Wood, of Edinburgh, was also alluded to; but it was shown to differ from this formation in important particulars. Shortly after this date, a case of painful neuroma of the skin was reported by Kosinski, which appears to have been almost identical in its general features with that under consideration, an abstract of which may be found in my "Treatise on Diseases of the Skin." I am not aware of any like case having been since reported.

In the July number of this Journal for 1874, there appeared a further

report of this case, including an account of the exsection of a portion of the brachial plexus of nerves, performed by the late Dr. F. F. Maury, for the relief of the excruciating pain which the patient suffered. It will be recalled that the result of the operation was, at the date of the last published note, tolerably satisfactory, the pain having been greatly relieved. These notes were dated four or five months after the operation. Subsequently, however—within a year—the pain became more violent, and two years later existed as severely as before the exsection. Since this date, up to the time of death, no marked change occurred.

The patient died in the ward for skin diseases of the Philadelphia Hospital February 16, 1880, six and a half years after the operation, having been under my observation about thirteen years. There remains but little to record from the last published notes to the time of death. A few small tubercles appeared on the back, but they did not attain the usual dimensions. The paralysis and the general atrophy of the limb remained unchanged. Death seemed to be the result of senile debility, the patient being in his eighty-third year. Notwithstanding the many years of great suffering, he continued in good general health until a month prior to his decease. Observations made a few days before death showed the area of hyperæsthesia to be the same as that recorded in the last report. The disease of the skin was everywhere exceedingly painful to the touch, while the whole limb was also the seat of spontaneous pain. Even during the last day the paroxysms of pain continued severe, causing him to cry aloud. Large doses of morphia did not materially lessen the suffering.

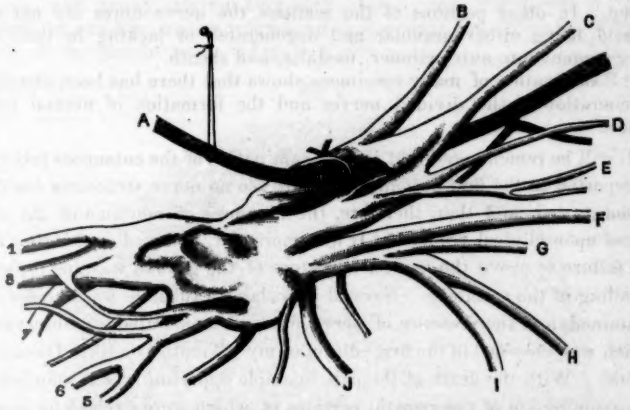
The *autopsy* was made by Dr. H. C. Boenning, house surgeon, thirty hours after death. There was complete absence of rigor mortis. The body was in a fair state of nutrition. The cicatrix over the left brachial plexus, situated one inch above the superior line of the clavicle at its middle third, was not adherent to the subjacent tissues, moving readily with the skin. The internal organs were for the most part normal. The brain was normal in appearance; the vessels at the base were the seat of atheromatous changes. The spinal cord was normal, as were also the membranes of the cord and of the brain.

The left (diseased) arm was semi-flexed, and seemed to be held thus by fibrous adhesions within the elbow-joint, slight motion only being possible. The shoulder-joint moved freely. The fingers of the left hand were flexed and distorted, and the nails were long and bent towards the palm. The skin of the anterior portion of the chest, from the median line of the sternum to the summit of the shoulder, and from the lower edge of the major pectoral muscle to the clavicle, of the outer aspect of the whole arm, and of the left scapular region, was the seat of discrete and confluent flat and raised tubercles, and in places of a diffuse tubercular infiltration, the lesions being most abundant over the outer aspect of the arm. The skin covering the forearm and hand was unusually thin, and was without sign of new growth. The deeper structures were laden with fat, which was infiltrated freely between the muscles, nerves, and vessels. Fatty degeneration and atrophy of the muscular tissue was marked.

I am further indebted to Dr. Boenning for a delicate dissection of the

nerves of the limb, as a result of which no connection between any of the nerve trunks or filaments and the tubercles was established; nor were any new growths found in the subcutaneous or deeper structures. The disease, therefore, was strictly cutaneous. The nerve-trunks were distributed normally. The brachial plexus of nerves was carefully dissected, when it was found that the cut ends of the nerves had united. A large ovoidal, whitish mass of firm tissue, one and a half inches in length, one-half inch in thickness, and one and an eighth inches in width, constituted the con-

Fig. 1.



The drawing (one-half natural size) represents the posterior or lower surface of the specimen. The nerves are drawn apart for the purpose of demonstration. The roots of the spinal nerves are indicated by figures 5, 6, 7, 8, 1, representing 5th, 6th, 7th, 8th cervical and 1st dorsal nerves. *A*, subclavian artery. Nerves: *B*, internal cutaneous; *C*, musculo-spiral; *D*, ulnar; *E*, circumflex; *F*, median; *G*, ?; *H*, *I*, musculo-cutaneus; *J*, supra-scapular.

necting band between the divided ends of the plexus. The formation was remarkably stout and strong. Its general form will be seen in the accompanying drawing, made by Dr. Boenning. The fifth and sixth nerves entered the mass as one trunk; the seventh alone, and on the upper surface. The lower two nerves, the eighth cervical and first dorsal, united to form a common trunk before entering the mass, or cicatrix, as it may be termed. From the lower end of the band there emerged three cords, which lower down divided into the various nerves of the arm. The nerves below the cicatrix were all more or less swollen and softened.

The nature of the cicatricial bond of union has recently been carefully studied by my friend Dr. George de Schweinitz, whose report is as follows:—

"*Microscopical Report on the Cicatrix after Division of Brachial Plexus.*—A square piece was taken from the centre of the cicatricial mass, between the entrance of the 5th, 6th, and 7th cervical nerves, and the exit of outer cord of the plexus. The specimen having been for some time in alcohol, no further hardening was necessary, and the excised portion was immediately imbedded in wax, and vertical and horizontal cuts made and examined after having been stained with carmine.

"Peripherally the mass is made up of various interlacing bands and

bundles of areolar tissue (white fibrous), sometimes well felted together and again forming a texture of looser consistence. In this connective tissue bed there are a few rows of fat cells, and here and there bloodvessels in cross-section. More centrally there are numerous bundles of nerve fibres, surrounded by their perineural and epineural connective tissue investments. Many of the bundles are composed of well-formed normal medullated nerve fibres, exhibiting axis-cylinder, medulla, and Schwann's sheath, the whole presenting a picture similar to what is seen upon making a cross-section of an ordinary spinal nerve. In some places, instead of a number of nerve bundles, a single fasciculus is seen surrounded by a mass of connective tissue. In other portions of the sections, the nerve fibres are not well formed, being either granular and degenerated or lacking in their full development into axis-cylinder, medulla, and sheath.

"Examination of many specimens shows that there has been abundant regeneration of the divided nerves and the formation of normal nerve tissue."

It will be remembered that in the examination of the cutaneous tubercles as reported in the first account of the disease no nerve structures could be demonstrated, and that, therefore, the diagnosis of neuroma of the skin rested upon clinical grounds. It was, moreover, believed at this time that the failure to prove the nervous structure of the growth was due to faulty handling of the specimen. Several years later a tubercle was excised and examined, and the presence of nerve fibres demonstrated, an observation which was recorded in the first edition of my "Treatise on Skin Diseases," p. 506. With the death of the patient ample opportunity was afforded for the examination of the growth, portions of which were excised for microscopic study. The specimens were entrusted to the care of my friend Dr. Henry F. Formad, whose reputation as a skilful microscopist is well known. The report of the examination, made by Dr. Formad's pupil Dr. George de Schweinitz, is so full of interest that I shall present it verbatim.[1]

"*Microscopical Report of Prof. Duhring's Case of Neuroma Cutis.*—In the early part of this month specimens of this growth, together with some of the muscular tissue from the forearm, were sent to the laboratory of Dr. Henry F. Formad by Prof. Duhring. Portions of the excised tubercles were immediately placed in alcohol and hardened for section.

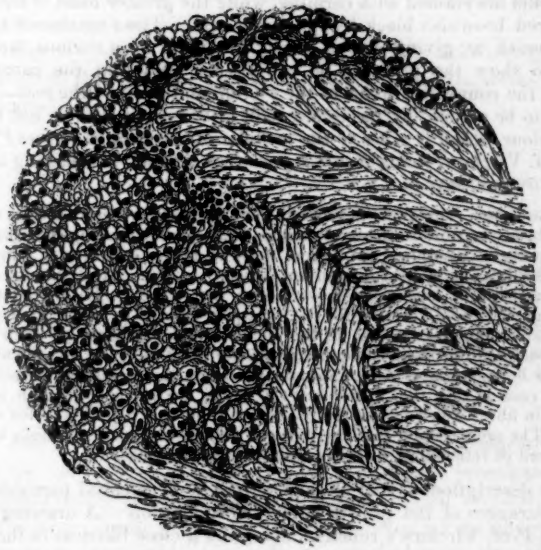
"Portions of the growth were also macerated in dilute hydrochloric and acetic acid and subsequently teased and examined in glycerine. Many sections were first placed in a solution of glacial acetic acid (5 to 15 per cent.), and these washed and stained with carmine. Small portions of the growth, unhardened by alcohol, were placed in lime and baryta water and allowed to remain from forty-eight to seventy-two hours, and then teased and examined in glycerine. The staining fluids used were: carmine, hæmatoxylon, indigo, carmine, chloride of gold ($\frac{1}{2}$ per cent.), and osmic acid ($\frac{1}{10}$ to 1 per cent.).

"Numerous transverse and vertical cuts, together with teased preparations, were made and examined by the methods above described. The

[1] The description is extracted from an admirable inaugural thesis from the pen of Dr. de Schweinitz on "Painful Tumours, with special reference to Neuromata," presented for the degree of Doctor of Medicine in the University of Pennsylvania, 1881.

growth consists essentially of the elements of the skin, densely packed connective tissue, and non-medullated nerve fibres. A typical section shows a connective tissue stroma, interwoven with the elements of the new-formation. The elements consist of fibres of various length and direction, but for the most part lying parallel with one another, each fibre being composed of a finely granular central substance, surrounded by a sheath, containing numerous elongated, oval, somewhat granular nuclei. In other words, it exhibits the elements of amyelinic or non-medullated nerves and the components of a true neuroma. In addition there may be seen yellow elastic tissue, bloodvessels with thickened walls which contain numerous nuclei, and finally, surrounding each vessel, small collections of round lymphoid cell-like bodies resembling in character the nuclei described in walls of the bloodvessels. (Fig. 2 × 300.)

Fig. 2.



"The diagnosis of neuroma amyelinicum, which, thus far, rests merely upon the appearances of the growth, is further substantiated by the exclusion of unstriated muscular tissue and fibrillar connective tissue, with which tissues the growth has been confounded.

"1. In regard to the first-named tissue, leaving out of the question the unlikelihood of the situation, the peculiar and distinct manner in which hæmatoxylon stains the nuclei of unstriped muscular fibres is absent in any section under observation. The fibres of unstriated muscular tissue form flattened bands, interlacing in various directions, and not round fibres such as these show themselves to be, and while, indeed, they possess nuclei, these are not contained in a sheath. Finally, which is conclusive evidence, no muscular cell whatsoever could be discovered even after prolonged maceration in hydrochloric acid and subsequent careful teasing.

"2. The problem of entirely eliminating connective tissue is confessedly a more difficult one. While freely admitting the presence of a large amount of connective-tissue stroma, this does not do away with the entity of those fibres that have been designated as nerves. The size and thickness of the fibres, their roundness in cross-section, the presence of a distinct sheath containing nuclei along its continuity, and the difference and contrast between them and what is undoubtedly fibrous or connective tissue, all give evidence of their histological nature.

"But more than this: applying the liquor calcis and baryta water test, I find, after carefully teasing a macerated specimen of this kind, that the compact masses and bundles of connective tissue are resolved into their ultimate fibrils, but that lying among them are the same fibres, designated as nerves, unaltered by seventy-two hours' contact with these reagents. Furthermore, in those sections treated with carmine and osmic acid, by way of an attempt at double staining, I find the papillæ of the skin and corium are stained with carmine, while the greater mass of the growth is coloured brownish black by the osmic acid. The experiment is quoted not so much as giving strong proof, but more as a curious fact which seems to show the presence of two tissues, and that the carmine has selected the connective tissue of the section and allowed the rest—nervous tissue—to be stained by the osmic acid, although, of course, not the inky black colour which it gives to the medulla of medullated nerves?"

"Prof. Virchow, in his *Krankhaften Geschwülste*, in speaking of amyelinic neuromas, says:—

"'These cases (amyelinic neuromas) have been until recently always reckoned among fibrous or fibro-nucleated tumours, because after treating them with acetic acid we perceived nothing but a great mass of rather long nuclei lying among a firm, fibrillated or striped ground substance. . . . More careful handling of the preparation, however, convinces one that these nuclei are contained in fibres, and that these fibres lie for the most part parallel to one another and form quite distinct bundles, which, in the richness and regularity of their ovalish, narrow nuclei, differ from all connective-tissue bundles. . . . An essential difference between these neuromata and fibromata and so-called fibro-nucleated tumours rests in this, that in the first the nuclei are not contained in cells simply, but in fibres which have a double contour and can be followed for some distance. The cross section of these fibres is round or at least roundish, but never star-shaped or reticulated, as is the case with the fibromas.'

"The description, as will be seen, agrees in all essential particulars with the appearances of the growth under consideration. A drawing accompanying Prof. Virchow's remarks also bears a close likeness to that representing the disease in our case. In one osmic acid preparation medullated nerve fibres were seen in cross-section. They were by no means frequent; the axis-cylinder was not well marked, and it was not possible to trace them to any connection with nerve trunk or branch. In one section only did there seem to be any connection between the nerves of the mass of the growth and those already existing in the skin. The elements of the skin differed in no essential particular from the appearances described in Prof. Duhring's original paper, pp. 8 and 9. The muscular tissue was teased and examined, mounted in glycerine. There was marked atrophy of the muscular fasciculi, and in many places there were evidences of fatty degeneration.

"These investigations were carried on in the laboratory of Dr. H. Formad, under his direct supervision, and the diagnosis has, in all particulars enumerated in the report, been confirmed by him.

GEORGE DE SCHWEINITZ."

From the foregoing observations and studies, it may be therefore stated that the disease is a skin disease strictly speaking. No other structure was in any way involved. Concerning the nature of the growth there can remain no doubt. The microscopic studies made by myself originally, and later by Drs. Formad and de Schweinitz, which I have had the pleasure of corroborating, prove conclusively, I think, that we have a true neuroma of the skin—one of the rarest of diseases. It may further be remarked that the complete reunion of the cut cords of the plexus, and the regeneration of normal nerve-tissue is also a matter of great interest. The thorough repair instituted by nature in the form of the stout cicatrix is likewise remarkable, though reunion was of course anticipated from the clinical history. Considering the character of this bond, it is questionable whether the excision of even two inches of the nerve would have proved sufficient to have prevented reunion.

In closing my report, I take pleasure in formally acknowledging my indebtedness to Drs. Boenning, Formad, and de Schweinitz, whose labours, I need scarcely state, give to this paper its chief value.

ARTICLE IX.

CONTRIBUTIONS TO THE STUDY OF THE TOXICOLOGY OF CARDIAC DEPRESSANTS. I. CARBOLIC ACID; A SUMMARY OF FIFTY-SIX CASES OF POISONING, WITH A STUDY OF ITS PHYSIOLOGICAL ACTION.

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LAST June, while pursuing a series of experiments in connection with a paper on the dangerous properties of chlorinated, brominated, and iodated anæsthetics,[1] it occurred to the writer that all decided cardiac depressants were capable at times, like chloroform, of acting wholly out of proportion to the dose used, even under apparently similar circumstances, and several instances were cited of poisoning by aconite, apomorphine, and tartar emetic, in connection with the cases due to the above classes of anæsthetics, to illustrate this belief. Not feeling satisfied to allow so interesting a question, and one of such momentous importance to the therapeutist, to remain unsettled, a survey of the articles on the toxicological effects of cardiac depressants was made. But the absence of statistical papers was so noticeable, and the details given so inadequate, and oftentimes so inaccurate, that the urgent need was felt for a series of papers which would faithfully depict the poisonous phenomena and such other

[1] See page 50 of the preceding number of this Journal.

features as would seem to be of interest and value to the therapeutist and toxicologist.

I have selected carbolic acid as the earliest to be discussed, because the knowledge of its physiological action among the profession seems to be so very limited, and as no study of any large number of cases has yet been made—the deductions appearing in the several essays already published evidently being based on a consideration of but few cases.

The following are the records of the cases, which have been very considerably condensed:—

CASE I. Female, aged 43.—*Dose and preparation taken.* Amount (?); crude. —*Symptoms.* Insensibility; retching; breathing stertorous; pupils contracted; pulse intermittent.—*Treatment.* Chalk; 7 ounces of olive oil injected into the stomach by stomach pump, and subsequently an emetic was given.—*Result.* Death in six hours.

Autopsy and Remarks. Strong smell of carbolic acid detected; œsophagus dark gray colour, harsh to the touch, and the inner part friable and tearing readily. The mucous membrane of the stomach was in a similar condition. The intestines presented the appearance from a dark gray above to a bright red and congested appearance in the jejunum. Brain congested. Blood incoagulable, and remained fluid up to time of writing, which was five days. Brain contained ℥ij serous fluid. (Harrison, *Lancet*, 1868, ii. p. 133.)

CASE II. Male, aged 64.—*Dose and preparation taken.* Rather over ℥j in ℥j of oil.—*Symptoms.* In ten minutes: the patient looked ill; flushed, perspiring, ineffectual attempt to vomit; eyes rolling wildly as if bewildered; mouth, tongue, and fauces whitened. (Mustard given, but stomach ineffectually evacuated; pump used and albumen given; castor oil injected into stomach.) In an hour: mental equilibrium restored; skin hot and perspiring; face flushed; pupils strongly contracted; pulse, rapid and soft; breathing somewhat laborious; voice harsh; deglutition difficult; thirst; retching; burning pain and tenderness at epigastrium. Acute gastritis supervened; features occasionally distorted by convulsive twitchings; hot, dry skin; temp. 102.5°, cold extremities; respiration shallow; pulse 140, small and hard; pupils contracted; intelligence perfect. Collapse ensued; imperceptible pulse; and cadaverous features.—*Treatment.* Emetics, albumen, castor oil, and stomach pump.—*Result.* Death in twelve hours from a failure of heart.

Autopsy and Remarks. The man had a compound comminuted fracture of the thigh, and in the above toxic condition bore manipulation with perfect equanimity, as if he was almost anæsthetized. (Anderson, *Lancet*, 1869, i. p. 179.)

CASE III. Female, aged 44.—*Dose and preparation taken.* Nearly ℥j impure carbolic acid.—*Symptoms.* Dyspnœa; epigastric pain; restlessness; mouth and lips whitened; brown stain on the chin; pulse 140, feeble; difficulty in swallowing; stupor; breathing slow and stertorous; pulse exceedingly feeble; comatose. —*Treatment.* Zinc sulphate, olive oil; no vomiting ensued; stomach pump used, and warm water injected.—*Result.* Death in 50 minutes.

Autopsy and Remarks. Left lung greatly congested; right emphysematous; mucous membrane of both lungs congested; left ventricle of heart strongly contracted, right partially so; mucous membrane of mouth, œsophagus, and stomach converted into a soft white material; blood fluid, became light red on exposure. (Brabant, *Lancet*, 1873, i. p. 302; also in *Guy's Hosp. Rep.*, 1879.)

CASE IV. Female, aged 7.—*Dose and preparation taken.* ℥ss diluted with ℥j glycerine and water.—*Symptoms.* Ten minutes—insensible; pulse almost imperceptible; pupils contracted; conjunctival reflex gone; temperature lowered; respiration catching and slowed; died comatose.—*Treatment.* Stomach pump, gruel and oil, enema of brandy; heat of body maintained.—*Result.* Death in 1 hour and 25 minutes.

Autopsy and Remarks. Right side of heart full of blood, which was dark and fluid; also larger vessels full of similar blood. Left ventricle contracted, and con-

tained only two drachms of blood. No abnormality in lungs or abdominal viscera, except alimentary canal. The tongue, mouth, fauces, œsophagus, and stomach and upper part of duodenum unaffected by poison, but small intestine for three feet was whitened. Blood fluid; brain contained much venous blood; no effusion into the ventricles, which were quite dry; odour of carbolic acid detected in brain. (Rickards, *Lancet*, 1873, i. p. 876.)

CASE V. Female, aged 20.—*Dose and preparation taken.* ℥iss impure undiluted acid.—*Symptoms.* Mouth and tongue whitened; pain in œsophagus and stomach; swallowed readily; hesitancy in speech in four or five minutes; stammers; totters in walk; insensibility in eight minutes; unable to swallow; breathing stertorous; pupils unaffected; pulse frequent, small and intermittent; extremities warm up to the time of death.—*Treatment.* Six eggs given through stomach tube; water and magnesia; the contents of stomach drawn off; artificial respiration for half an hour with some benefit.—*Result.* Died in little more than an hour after taking the poison.

Autopsy and Remarks. Lips and nose blistered; sinus of dura mater gorged with dark tarry blood; bloodvessels on surface of brain full; lungs and heart healthy, the latter empty; mucous membrane of mouth whitened, and of œsophagus and stomach congested and peeled off with the slightest touch; mucous membrane of intestinal canal did not appear much changed; smell of carbolic acid in all the organs; green stains in the stomach. (Swain, *Lancet*, 1869, i. p. 395.)

CASE VI. Male, adult.—*Dose and preparation taken.* Probably a mouthful of impure acid.—*Symptoms.* Probably ten minutes elapsed, then vomiting; comatose; contracted pupils; intermittent pulse; stertorous breathing; frothing at the mouth; livid appearance of eyelids, lips, and ears.—*Treatment.* Emetic by means of stomach-pump, but without success.—*Result.* Died in three-quarters of an hour.

Autopsy and Remarks. Tongue and fauces corroded. (Gerrard, *Lancet*, 1871. i. p. 672.)

CASE VII. Female, aged 37.—*Dose and preparation taken.* ℥j of—acid 1–10 linseed oil—(nearly 50 grains).—*Symptoms.* Twelve minutes or more, sufficiently conscious to reply when spoken to sharply; skin moist; face dusky; pulse weak; pupils slightly dilated; unconsciousness; duskiness deepened; moisture of skin increased; pupils dilated; pulse quick, irregular, and scarcely perceptible; breathing regular and noisy. In three-quarters of an hour, coma complete; face livid; pupils dilated; body and extremities warm and moist; pulse imperceptible; soft palate and tongue relaxed; breathing slow and regular; reflex sensibility of conjunctiva was now altogether lost.—*Treatment.* Stomach washed with tepid water; the oil which came out did not smell of the acid; aqua ammoniæ (2 gtts. FFF.) injected into vein of forearm, and in a few seconds the radial pulse became perceptible. Repeated injection in one-quarter of an hour with benefit.—*Result.* Recovery. (Shaw, *Lancet*, 1875, ii. p. 451.)

CASE VIII. Female, aged 29.—*Dose and preparation taken.* ℥ss (crude).—*Symptoms.* 5 minutes: collapse; cold; clammy; pulse 112, almost imperceptible; conjunctiva insensible; pupils dilated and immovable; respiratory movements almost imperceptible, and were 56 in a minute; froth from the nostrils; breathing stertorous; cardiac movements weaker and intermittent; pupils contracted somewhat; face livid.—*Treatment.* Olive oil given first with a spoon and then with pump; solution of sodium carbonate given; stomach emptied; brandy per rectum, and mixed with milk; sinapisms to legs.—*Result.* Died in forty-five minutes.

Autopsy and Remarks. Rigors strongly marked; dependent parts congested; skin corroded at angles of mouth; froth from inflamed nostrils; blood fluid, and smelt of carbolic acid; brain smelt of acid; ventricles of brain full of serous fluid, odour of carbolic acid detected; vessels full of fluid blood; trachea in a state of acute inflammatory congestion; lungs and bronchial tubes congested; heart pale and flabby, and contained fluid blood in all cavities; mouth and tongue blanched; mucous membrane of œsophagus white and rough, and the epithelium appeared replaced by false membrane which could be stripped off, leaving a red congested surface; cardiac end of stomach reddened, and in a state of acute inflammatory

congestion, mucous membrane soft and smooth; bladder contained four ounces of urine, smelt of carbolic acid, but otherwise normal. (Packer, *Lancet*, 1878, ii. p. 511.)

CASE IX. Male, aged 32.—*Dose and preparation taken.* 10 A. M., swallowed a quantity of a solution.—*Symptoms.* Immediately: nausea; cold sweats; stupor; unconsciousness (12.30, magnesia given); profound insensibility; noisy, tracheal rales in breathing; death apparently imminent. (Mustard poultices applied to the whole surface.) 5 P. M.: temperature risen nearly to normal; coma; complete relaxation of the limbs persisted; anæsthesia of skin and mucous membrane of mouth, nose, pharynx, and bladder; complete loss of reflex excitability; cornea and conjunctiva insensible; pupils contracted; respiration (48) stertorous, with tracheal rales; pulse (128) small. He had passed no urine, but some which was drawn off was yellow, with a violet tint by reflected light, and which smelt of carbolic acid. On its surface were some oily drops. Some drawn blood was of a singular brown colour, and possessed the odour of the acid. The clot formed was soft and diffluent, and did not contract.—*Result.* Death in nine and a half hours.

Autopsy and Remarks. All parts smelt strongly of carbolic acid. No distinct lesions of the mucous membrane were found above the stomach. The membrane of the stomach was thickened, marked with black cauterized spots, and elsewhere deeply congested, and in one or two places were submucous hemorrhages; it was not ulcerated; kidneys deeply congested; some spots of effused blood under the capsule and in cortex; the tubuli were perfect; epithelium fatty and completely degenerated. Albumen and acid found in the urine. (Rendu and Patrouillard, *Jour. de Pharm. et de Chem.*, Dec. 1871; *New Remedies*, April, 1872, p. 341.)

CASE X. Male, aged 60.—*Dose and preparation taken.* Not more than ℥j. (?) —*Symptoms.* Frothing at mouth; countenance turgid; quite speechless.—*Result.* Died in a few minutes of shock and depression.

Autopsy and Remarks. Body discoloured; superficial veins engorged; mouth and throat whitened; faint odour of carbolic acid; veins of scalp gorged with dark blood; brain free from any sign of congestion; but little fluid in cerebral ventricles, merely moisture; lungs full of dark blood, but normal; heart pale, fatty, quite empty; stomach contracted and coats thickened; contained about an ounce of turbid, pinkish fluid, smelling strongly of carbolic acid and giving a strong reaction; mucous membrane whitened on tops of furrows but reddish in furrows; œsophagus slightly affected; no trace of severe local effects in intestines, which were reddened along superficial surface. The appearance of the mucous membrane extraordinary and characteristic; cardiac end of stomach principally affected. (Barlow, *Lancet*, 1869, ii. p. 404.)

CASE XI. Female, aged 60.—*Dose and preparation taken.* ℥vj (?) Calvert's used in XI., XII., and XIII.; applied acid to surface of body; had itch.—*Symptoms.* In a few moments smarting pain and headache; giddiness, approaching insensibility. Twenty-five minutes: prostration; spasmodic breathing; total insensibility; surface of body hard and dry; occasional spasm of diaphragm; pupils unaffected and responded to light. Continued unconscious for four hours, the breathing was laboured and slow.—*Treatment.* Acid washed from skin by tepid water and soft soap; brandy with ammonia and ether, some was swallowed. —*Result.* Died in four (?) hours.

Autopsy and Remarks. Small patches of sloughy skin about the body. (Machin, *British Med. Journ.*, 1868, i. p. 220.)

CASE XII. Female, aged 23.—*Dose and preparation taken.* (See Case XI.) Applied acid to surface of body.—*Symptoms.* (See, also, Case XI.) Unconscious for five hours; consciousness gradually returned; attempts at vomiting; mustard given; but little of stomach contents were evacuated; retching considerable; strong odour of carbolic acid in expiration; respiration lost spasmodic character, quick and irregular; continued pain in head and throat. In the morning epileptiform convulsions came on; pain in head better, but throat unrelieved; symptoms of congestion of lungs; gradually sank; conscious until the last. Patient said to be an epileptic, and to have had convulsions when application was made.—*Treatment.* Emetic of mustard given with but little effect; strong coffee given with benefit; leeches to temples in course of morning; alkaline mixture of

potassium chlorate and chlorine given, but symptoms of congestion of lungs came on and patient collapsed.—*Result.* Died in about forty hours.

Autopsy and Remarks. Small patches of sloughy skin about the body. (Machin, *British Med. Journ.*, 1868, i. p. 220.)

CASE XIII. Female, aged 68.—*Dose and preparation taken.* (See Case XI.); applied the acid to surface of body; had itch.—*Symptoms.* (See, also, Case XI.) Rallied in about four hours; states that as soon as dressing was used, she felt giddy-drunk; head felt constricted by band; unconsciousness; no vomiting in this case; pulse (80) regular and feeble; skin harsh, dry, puckered; no vesication in any of the three cases (XI., XII., XIII). Skin thrown off often in scaly patches.—*Treatment.* (As in Case XI.)—*Result.* Recovered in twenty-one days. (Machin, *British Med. Journ.*, 1868, i. p. 223.)

CASE XIV. Female, aged 51.—*Dose and preparation taken.* A case of excision of elbow-joint. Dressed with lotion, one part to fifty.—*Symptoms, etc.* Dec. 2, seventy-two hours: "shivering fit;" tongue rapidly fouled; pulse 100–120, weak and irregular; skin cold and clammy; very uncontrollable vomiting; face pinched and anxious; spirits depressed. Fifth day, rapidly sinking; pulse 130–140, and thready; tongue has a brown coat; cerebration clear; urine scanty and loaded with lithates, but not dark or carbonaceous. The carbolic lotion was the same day changed and flaxseed used instead, and in the course of forty hours pus was present in poultices, and the constitutional irritability removed. Improving up to Dec. 15, when lotion was again employed (same strength). Thirty-six hours: vomiting, and same symptoms as before. The discharge, which was purulent on the 15th, became scanty and rusty on the 17th; poultices again substituted on the 18th.—Poultices used up to the 27th, when lotion was applied with a similar result as above; wound was now nearly healed. The lotion was discontinued and warm water used.—*Result.* Recovered.

Remarks. Nothing was found in this case to be able to check the vomiting caused by the carbolic acid. (Lightfoot, *British Med Journ.*, 1870, i. p. 331.)

CASE XV. *Dose and preparation taken.* One part to five of linseed oil, used as a dressing for bedsores in typhus fever.—*Symptoms.* Two days dressed with lint soaked with the carbolic acid and oil. After the second dressing severe vomiting; urine became very dark. On discontinuing carbolized oil, the symptoms ceased, and urine became natural. No signs of blood corpuscles in the urine could be detected with the microscope, only carbonaceous particles.—*Result.* Recovered. (Wilks, quoted by Lightfoot, *Brit. Med. Journ.*, i., 1870, p. 332; also *Guy's Hosp. Reports.*)

CASE XVI. Male, adult.—*Dose and preparation taken.* Carbolic enema.—*Symptoms.* During administration fit occurred; stertorous breathing.—*Result.* Death in twenty minutes. (Worcester Infirmary, quoted by Lightfoot; Ibid.)

CASE XVII. Female, aged 1 year.—Had extensive ulceration of gluteal region and labia, following from sitting on block on which some of the disinfectant, ℥j to Oj of water, had been thrown two days before.—*Symptoms*, etc. The next morning after sitting on the block the blistering had commenced and ulceration rapidly followed. Used fullers' earth and French chalk with comforting effect. On fifth day used lotion of lead-water with glycerine, several sloughs formed and separated; child became weaker from exhaustion and shock; some signs of internal inflammation; usual remedies used.—*Result.* Died on tenth day.

Autopsy and Remarks. Rectum inflamed; patches of inflammation in intestine; right pleura much inflamed. Child had been perfectly healthy before. (Sandwell, *British Med. Journ.*, ii., 1870, p. 382.)

CASE XVIII. Male, aged 47.—*Dose and preparation taken.* ℥j or ℥ij (?) (crude, black and oily).—*Symptoms.* Shortly afterward found insensible; smelt of carbolic acid; speechless; cannot walk; unconscious; stertorous breathing; puffing of lips at expiration; heat of body natural; pulse disturbed (84–106) and intermitting; emetic had no effect; lips, gums, and tongue whitened; no muscular movements in three or four hours; eyelids closed; pupils contracted to a pin's point; at six and one-half hours opened eyes and moved the extremities; after this pupils expanded; began to speak; asked for cold water, but never regained complete consciousness. Then laborious breathing occurred; difficult muco-purulent expectoration; breathing easier and coma lessened; severe pain in back;

respiration 46–48. Eight and one-half hours: passed a quantity of very dark-coloured urine, which smelt of carbolic acid. Afternoon, attempted to pass water, but unsuccessfully; brow, face, and hands covered with a clammy perspiration; collapse.—*Treatment.* Castor oil, olive oil, and emetic; stomach-pump (would not work); ammonium carbonate and brandy, but to no purpose.—*Result.* Died in thirteen and one-half hours.

Autopsy and Remarks. Lividity of back and front of neck and chest; face sallow; pupils natural; watery froth and yellowish fluid at mouth and nostrils, which smelt of carbolic acid; clot in longitudinal sinus; dura mater and arachnoid congested; blood smells of carbolic acid; serum found in ventricles and subarachnoid; gray matter of brain of pink hue; intense congestion of vessels on under surface of pons and medulla. Mucous membrane of mouth, throat, and gullet whitened, sodden, soft, and easily detached; ℥ij thick brownish pulp in stomach; great curvature covered with hard, reddish, and elevated points the size of shot, without any marked congestion; similar points on other portions of stomach, tending to follow the course of the vessels; stomach otherwise normal, perhaps more vascular. Portions of intestine of slate colour; containing brownish pulpy substance; heart full of dark firmly clotted blood on both sides, right side ℥iv, left ℥ij; ℥iv whitish urine in bladder; universal smell of carbolic acid; blood everywhere firmly clotted. (Ogston, *Brit. Med. Journ.*, 1871, i., p. 116.)

CASE XIX. Male, adult. *Dose and preparation taken.* Exposed for three hours to fumes of strong carbolic acid.—*Symptoms.* Violent convulsions with trismus; quite comatose; lividity of face; stertorous breathing; extremities and surface cold; pulse scarcely perceptible; warm bath was given; in forty minutes convulsions ceased; sensibility partly restored; face and neck assume a natural hue; symptoms improved. Six hours later, passed urine, which was more acid than normal, but no odour of carbolic acid; complained of giddiness; no pain in head, but pain in face and eyes, with taste of carbolic acid in mouth and throat, and gastric irritation.—*Treatment.* Wrapped in blankets; hot water to feet; cold applications to head, and mustard to nucha; aperient mixture, bismuth subnitrate, dilute hydrocyanic acid (P. L.), a gargle of potassium chlorate and myrrh, and a liniment of belladonna with soap liniment to neck and face; warm baths.—*Result.* Recovered. (Nuthank, *Brit. Med. Journ.*, 1872, ii., p. 579.)

CASE XX. Male, aged 7.—*Dose and preparation taken.* Probably a mouthful of the impure carbolic acid.—*Symptoms.* Stertorous breathing; complete stupor; total muscular relaxation; anæsthesia; pulse feeble and rapid (160); temperature lowered; pupils contracted; salivation; power of swallowing lost; failure of respiration and pulse; collapse.—*Result.* Died in about seven hours after symptoms were first observed.

Autopsy and Remarks. Post-mortem in twenty-four hours: rigor mortis present, but not to any marked degree; cerebral sinuses distended by dark fluid blood and some soft coagula; cerebral vessels in a similar condition; little fluid in subarachnoid space and ventricles; faint odour of acid detected, also in thorax, but intensified; venous congestion of thorax and abdomen; blood dark and fluid; lungs congested, œdematous, and emphysematous; heart empty, left ventricle contracted, right one flaccid, also empty; no coagula in great vessels; mucous membrane of mouth, throat, and œsophagus white, sodden, congested, but not detached; stomach same character; contained some injection, but no capillary hemorrhage; liver, spleen, and kidneys hyperæmic; bladder contained eight ounces urine of an olive-green tint, peculiar mixed odour, contained no albumen; carbolic acid detected in urine with chemical tests, and also in viscera. (Ferrier, *Brit. Med. Journ.*, 1873, i. p. 167.)

CASE XXI. Male, aged 36. *Dose and preparation taken.* Probably ℥j of undiluted acid.—*Symptoms.* Five minutes: mortal agony; lividity; protrusion of eyeballs; continued subdued cry of "wild and fear-inspiring tone," which was broken by gasping respiration and inefficient attempts to vomit; condition followed almost immediately by profound insensibility. From the first the pulse was very rapid and feeble; respiration short and infrequent; pupils unaffected.—*Treatment.* Olive oil poured in the mouth; warm water was injected in stomach and withdrawn, impregnated with carbolic acid; second injection of olive oil;

difficulty of introducing pump experienced.—*Result.* Died in thirty minutes, apparently asphyxiated.

Autopsy and Remarks. Superficial veins, especially, extremely distended with blood; lips and chin excoriated; dura mater congested with dark venous blood; arachnoid at vertex thickened with gelatinous matter; brain healthy; lungs emphysematous in front, passive congestion posteriorly; pericardium contained ℥j serum; heart healthy, all cavities full of blood, which was dark and perfectly fluid, with no coagula; mucous membrane of larynx, trachea, and subdivisions highly congested, granular, and softened; and air-tubes contained small quantities of olive oil and carbolic acid; tongue shrunken, pale, indurated; mucous membrane of œsophagus white, glistening, softened, peeling off as if scaled; mucous membrane of stomach softened and eroded, and with muscular coats reduced to a state of pulp, parts above orifices sustained most injury, and were of a dull, deep slate colour; small intestines similarly affected. (Hearder, *Brit. Med. Journ.*, 1878, i. p. 584.)

CASE XXII. Male, adult.—*Dose and preparation taken.* Two or three drachms in a mixture.—*Symptoms.* Immediately fell insensible and convulsed, and in eighteen minutes extremities were cold; pulse scarcely perceptible and irregular; breathing stertorous; consciousness lost; trismus.—*Treatment.* Stomach evacuated; bled to Oj.—*Result.* Recovered on eleventh day. (Hearder, *loc. cit.*)

CASE XXIII. Male, aged 72.—The patient was suffering with a suppurating stump.—*Dose and preparation taken.* Sucked carbolic acid from a sponge which had been placed under the bed as a disinfectant.—*Symptoms.* Semi-comatose; pulse (98) feeble; respiration 48; olive oil and castor oil given, which was swallowed very slowly, also zinc sulphate and tartar emetic; no vomiting; pulse and respiration better; coma.—*Treatment.* Olive and castor oil; ℈j zinc sulphate; two grains tartar emetic.—*Result.* Death in about four hours.

Autopsy and Remarks. Lips, chin, right side of face, right breast and hand coloured brown, and a strong odour of carbolic acid; dura mater and arachnoid very much congested; brain substance healthy. Mucous membrane of mouth and tongue white and softened, and of larynx thickened; of pharynx and œsophagus pale, thickened, soft, and corroded; of stomach soft, corroded, congested, and also white. Intestines softened, and part corroded; odour of carbolic acid detected in the cæcum. (Biddle, *Brit. Med. Journ.*, 1873, i. p. 611.)

CASE XXIV. Female, aged 43.—*Dose and preparation taken.* ℥j impure carbolic acid.—*Symptoms.* Five minutes: insensible; face blanched and perspiring; pupils contracted; pulse 100, feeble and irregular; respiration stertorous, breath smelt of carbolic acid; slight lividity of lips and tips of fingers. Rapidly grew worse, and became much swollen before death.—*Treatment.* Emetic and stomach-pump; the patient could not swallow the emetic, and the pump only brought out a small quantity of contents which smelt strongly of carbolic acid; difficulty of introducing pump experienced.—*Result.* Died in one and a half hours.

Autopsy and Remarks. Angles of mouth and skin discoloured and shrivelled; interior of mouth whitened; tongue dry and chippy; mucous membrane of œsophagus dry, shrivelled, and brownish; heart feeble, both ventricles were empty; mucous membrane of stomach readily peeled from walls, white patches over it, and whole slightly inflamed; mucous membrane of duodenum similarly affected, but less so; dura mater natural; arachnoid thickened and opaque; brain apparently healthy. (Sutton, *Med. Times and Gaz.*, 1868, i. p. 456.)

CASE XXV. Male, aged 19. The patient was suffering with enteric fever, and the acid given by mistake.—*Dose and preparation taken.* ℥ss impure carbolic acid.—*Symptoms.* Unable to swallow; almost pulseless; difficult respiration; lividity and a mottled appearance; stools black-brown; urine dark brown or blackish; collapse.—*Treatment.* Brandy given; nutrient enemata of beef-tea and brandy, and iced milk by mouth.—*Result.* Died in two days. (Wiltshire, *Med. Times and Gaz.*, 1870, ii. p. 474.)

CASE XXVI. Male, aged 65.—*Dose and preparation taken.* ℥ss–℥j (?) impure acid.—*Symptoms.* Insensible; stertorous breathing; mouth and throat filled with mucus; stains of acid on chin; pupil contracted; pulse 40–50, and

laboured; life nearly extinct; respiration irregular; heart-beats inaudible.—*Result.* Died in fifty minutes.

Autopsy and Remarks. General aspect as if dead by asphyxia; brownish lines from angles of mouth. Blood dark, fluid. No coagula, except in lungs. Mucous membrane of mouth and œsophagus whitened, firm, congested, hard, and tough. Stomach contained ℥iv of thick, turbid fluid; smells of carbolic acid. Mucous membrane white, shrivelled, in granular masses, and easily scraped off; rugæ hard. Larynx, trachea, and bronchi filled with transparent mucus, streaked with blood. Heart flabby, and slightly fatty; left side contained little blood; right empty. Viscera congested. Arachnoid cavity contained ℥x fluid. (Jeffreys and Hainsworth, *Med. Times and Gaz.*, 1871, i. p. 423.)

CASE XXVII. Female, aged 7.—*Dose and preparation taken.* Probably a mouthful, drunk from a demijohn of it used for disinfectant purposes.—*Symptoms.* Lips white, shining, and puckered; odour of carbolic acid detected; face of a leaden hue; cold sweat; eyes fixed; pupils slightly *dilated;* extremities cold; complete insensibility. Inability to induce emesis. Some improvement after use of stomach pump. Consciousness returned one and half hours after poisoning; heart feeble; pulse at wrist not countable. Pain in epigastrium. In three and three-quarter hours, respiration 40; pulse small and could not be counted. Pupils *contracted;* extremities cold. Three and three-quarter hours later, pulse 144; respiration 36; temperature 98°; less jactitation; drinks milk; "feels sick;" pupils widely *dilated;* relaxation of bowels. Twenty-third hour, face pale; respirations somewhat stertorous; slight convulsions; eyelids partly closed; semi-conscious; asks for milk constantly; lividity less; pupils *dilated;* extremities cold; respirations 50; relaxation of bowels. In fifteen minutes, unconsciousness; increased stertor; died five minutes later.—*Treatment.* Egg beaten up and poured down throat with a pump, three minutes after poison was taken, and shortly after albumen was given in same way. Later, a mixture of olive and castor oils, and afterwards wine of ipecac, were given. Stomach pump brought out albuminous coagula, which smelt of carbolic acid.—*Result.* Died in twenty-four hours.

Remarks. This patient was suffering with ascites. (Woodman, *Med. Times and Gaz.*, 1875, i. p. 421.)

CASE XXVIII. Female, aged 40.—*Dose and preparation taken.* ℥iv crude carbolic acid, which was taken at 9 o'clock in the evening.—*Symptoms.* In twenty minutes, uneasiness; collapsed; blanched; no vomiting or convulsions; respiration stertorous; pupils contracted; pulse hardly perceptible, not rapid. Washed out the stomach. Two hours later, condition better, but remained unconscious. Midnight, semi-conscious; pupils contracted; pulse quick and feeble; surface cold; convulsive twitchings; vomited bloody and oily matter. Some return of consciousness; able to swallow brandy and milk, but vomited. Late that day the evacuations of the bowels were black, and afterwards dark brown. Urine smoky colour and aromatic odour; no albumen. Epigastric tenderness. Dark-brown stain on upper lip, mouth, and chin. For a couple of days later she remained in a dangerous condition, and the urine remained smoky; she then improved slowly.—*Treatment.* Stomach pump; mustard to calves of legs and heart; stomach thoroughly washed; Oj olive oil injected. First day, milk and brandy, barley water, milk and lime-water, and ice.—*Result.* Recovery; left the hospital on the 17th, having taken poison before midnight on the 15th. (Davidson, *Med. Times and Gaz.*, 1875, ii. p. 597.)

CASE XXIX. Male, aged 57.—*Dose and preparation taken.* Amount (?) eighty per cent. acid.—*Symptoms.* Carried into hospital insensible, and emetics given. Vomited freely. Tongue and mouth were quite white; large white patch from mouth to chin; sore throat during the night, but well otherwise. Olive oil applied locally, and a mixture of mucilage given, ℥j, every four hours, internally. Next day, sore throat; urine dark, clear, faintly acid, no albumen, sp. gr. 1044. Carbolic acid found in urine. Second day, sore throat; fauces covered with white patches; tongue corrugated; bowels open; appetite good; left hospital in the afternoon.—*Treatment.* 25 grains zinc sulphate effectual; olive oil externally; mist. mucil. ℥j every four hours.—*Result.* Recovered; discharged second day. (Forster, Guy's Hosp., *Med. Press and Circular*, 1878, ii. p. 42.)

CASE XXX. Male, adult.—*Dose and preparation taken.* About ℥ss Calvert's No. 5.—*Symptoms.* "Sudden and fatal sedation of nervous centres." Probably died without suffering.—*Treatment.* Emetics given, but produced no effect.—*Result.* Died in ten or fifteen minutes. (Hill, *Rich. and Louis. Med. Journ.;* quoted in *N. Y. Med. Record*, 1873, viii. p. 383.)

CASE XXXI. Male, adult.—*Dose and preparation taken.* ℥ss impure.—*Symptoms.* Suffered no uneasiness, except burning pain in throat for a few days. He had been an opium eater, and took some olive oil as soon as he found out his mistake.—*Treatment.* Olive oil.—*Result.* Recovered. (Outerbridge, *N. Y. Med. Record*, 1873, viii. p. 517.)

CASE XXXII. Male, aged 2½.—*Dose and preparation taken.* ʒj pure; equal to Calvert No. 2.—*Symptoms.* Immediately child ran about the room crying; then instantly became unconscious; lividity; eyes staring; respiration stertorous; foaming at the mouth and nose; pupils dilated, but responding to light; twitching of muscles of the extremities; capillary circulation slow. Vomiting excited to a slight degree by titillating the fauces; quantity of tenacious, partially coagulated mucus expelled at each attempt at vomiting. Vomited mucus mixed with blood. Temperature raised; cough croupy. Throat whitened and shrivelled. Urine dark olive-green colour, with odour of the acid. Stools greenish, thin; became dark and smoky after standing some days.—*Treatment.* Olive oil; white of egg; vomited; milk and lime-water; bismuth and chalk every three hours.—*Result.* Recovered (Dusau, *N. Y. Med. Record*, 1878, xiii. p. 289.)

CASE XXXIII. Male, aged 5.—*Dose and preparation taken.* Cavity of open abscess injected with diluted acid, according to Callender, of London.—*Symptoms.* Radial pulse absent; skin pale, cold, and damp; respiration short, hurried, and over 100. (Brandy given hypodermically); pupils contracted. Belladonna given and repeated, pupils then became dilated; pulse perceptible; respiration 100, reduced to 70.—*Treatment.* Hypodermic injections of brandy; belladonna.—*Result.* Recovered. (Post, *N. Y. Med. Record*, 1879, xv. p. 378.)

CASE XXXIV. Aged 2.—*Dose and preparation taken.* ʒj of mixture of equal parts carbolic acid and olive oil taken at eight o'clock.—*Symptoms.* Five minutes, pain in bowels; soon became insensible. Ten minutes, partially comatose; pulse 120; difficult breathing; congestion of lungs; paralysis of muscles of pharynx. 8.30, insensible; left pupil slightly dilated, but sensitive; extremities cold. 8.45, left iris more dilated, less sensitive; breathing apparently improving under ammonia. 9, paralysis more marked; breathing becoming difficult, artificial respiration necessary. 9.20, pupils more sensitive to light; congestion of lungs becoming less. 9.30, pulse 140; breathing about normal; extremities warm. 10, improving. 12.30, vomiting some; oil given. Next day better; complains of pain in head.—*Treatment.* Carbonate of ammonia; castor oil.—*Result.* Recovered in a few days. (Ghent, *Canada Lancet*, 1875, i. p. 67.)

CASE XXXV. Female, aged 50.—*Dose and preparation taken.* ʒij; woman in delicate health.—*Symptoms.* Did not complain of much burning sensation; gave sodium bicarbonate and olive oil, followed by extract of ipecac. General debility; violent burning sensation from fauces to stomach; pulse slow, full, regular; semi-comatose; can scarcely move her limbs; relaxed; with difficulty swallowed oil. Pulse unchanged. Forty minutes after taking poison, apomorphia given, followed by emesis; vomit smelt of carbolic acid. Violent efforts at emesis every twenty minutes for one and a half hours. No sinking or flagging of pulse; no cold extremities. Urine copious, smoky colour, smells strongly of carbolic acid; continued copious for twelve hours longer, and gradually improved; bowels relaxed. Five and a half hours after poisoning, pulse 96, full and regular; temperature 101°. Lay in a critical condition for two days; then greatly improved. —*Treatment.* Sodium bicarbonate, olive oil, enema of oil, apomorphia (about half a grain) hypodermically, mucilage, milk, and water.—*Result.* Recovered. (Semple, *Virginia Med. Monthly*, May, 1877, iv. p. 138.)

CASE XXXVI. Female, aged 39. Suffering with carcinoma uteri; the neck being nearly destroyed, leaving the body of uterus open.—*Dose and preparation taken.* Applied, locally, cotton-wool pessaries saturated with carbolic acid, glycerine, and oil, the carbolic being in the proportion of one part to eight of liquid. —*Symptoms.* This treatment was continued from Nov. 17th to Jan. 7th, when

she suddenly became insensible; convulsions; inability to void urine. Suppression of urine continued until the 11th, when some water was discovered in the bed. 17th, another convulsion; fatal collapse. For several days before death, anasarca.—*Treatment.* Dry-cupped loins, hot fomentations, salines, ten-minim doses tr. digitalis.—*Result.* Died. (Edwards, *Practitioner*, 1869, iii. p. 324.)

CASE XXXVII. Female, aged 41. Suffering with cancer.—*Dose and preparation taken.* Injection ordered of "one part of carbolic acid, glycerine ʒj, and ʒxx water." This was used *ter in die* for some days; then "applied daily a cotton-wool pessary saturated with carbolic acid, tannin, and glycerine, the strength being one of acid to sixteen parts of water."—*Symptoms.* Commenced treatment Sept. 6th. Sept. 27th, hiccough; sickness; prussic acid and salines given, with a blister to epigastrium. Oct. 2d, rigors; extremities cold. 3d, partially unconscious; face œdematous; legs much swollen; no water passed. 4th, no better; delirium at night; no water passed, and bladder emptied by passing a catheter. 5th, hemorrhage (uterine); anasarca; and at times, insensibility. 10 P. M. drew off ʒij bloody urine. Oct. 8th, decidedly worse. 10th, little more urine passed. 11th, died comatose.—*Result.* Died. (Edwards, *Practitioner*, 1869, iii. p. 324.)

CASE XXXVIII. Male, aged 40.—*Dose and preparation taken.* Probably a whiskeyglassful of the impure acid.—*Symptoms.* Pallor; coldness of surface; insensibility, and coma; respiration slow and laboured; pupils fixed and insensible to light; no erosion or mark on face or lips. Stomach pump brought up a quantity of dark fluid. Next day passed dark, almost black, urine; no carbolic acid or albumen in secretion. Pulse frequent and weak.—*Treatment.* Turpentine enema, sinapisms, stomach pump, ammonia to nostrils, opium, and morphia.—*Result.* Recovered. (Warren, *Irish Hosp. Gaz.*, 1875, iii. p. 17.)

CASE XXXIX. Female, aged 33.—*Dose and preparation taken.* ʒss liquefied carbolic acid.—*Symptoms.* Immediately "felt mad;" "fought the air." Fifteen minutes, uneasiness. 4 o'clock, uneasiness; extremities somewhat flexed and rigid; trismus; pupils contracted; pulse feeble; respiration attended with "rattles." 7 A. M. pulse extremely weak; surface cold. 12.30, severe burning in stomach; sore throat; painful deglutition; headache; no thirst; temperature 98°; pulse 90 and weak. 7 P. M. delirious at times; nausea, but no vomiting; hurried respiration.—*Treatment.* Morphia, brandy, beef-tea, milk, eggs, etc.—*Result.* Recovered. (Walker, *Boston Med. and Surg. Journ.*, 1879, p. 797.)

CASE XL. Female, aged 35.—*Dose and preparation taken.* Scarcely less than ʒviij.—*Result.* Died very soon.

Autopsy and Remarks. Mucous membrane of œsophagus, stomach, and small intestine thickened and corrugated, and of a bluish-white colour. Action of poison ceased abruptly fifty inches from pylorus. Œsophagus at point of stomach so much contracted that the point of a probe was passed with difficulty. Blood fluid, very dark; cavity of heart moderately full. Viscera and urine exhaled the odour of the acid. Mode of dying seems to be *syncope* or *shock*. (Way, *Trans. Path. Soc.*, 1873, xxiv. p. 93.)

CASE XLI. Aged 21 months.—*Dose and preparation taken.* ʒj crude carbolic acid.—*Symptoms.* Ten minutes, motionless; insensible, but recovered in a little time. Pupils contracted, insensible to light; conjunctiva insensible; pulse 120 and very weak; cold and clammy; lividity of lips; respiration impeded; strong tarry odour of breath; vomited frothy liquid. Unable to swallow emetic. Breathing grew worse; (artificial respiration used); lividity worse; (tracheotomy, which enabled the child to breathe easier). Four hours, respiration 80; anæsthesia; contraction of pupil. Child vomited later.—*Treatment.* Unable to introduce emetic into the stomach, as œsophageal walls seemed spasmodically contracted; artificial respiration; tracheotomy performed.—*Result.* Died in ten hours.

Autopsy. Twelve hours after death. Brown discoloration of skin about mouth, which is dry and shrunken. Bronchi contained a brown-red liquid, which choked tubes and smelt of acid. Mouth whitened; dense epithelium loosely connected; œsophagus the same. White line terminated abruptly at stomach. Stomach, at anterior part, lower curvature, and in isolated patches on anterior

and posterior surfaces, greatly changed. Change consisted of red-based patches with red borders, mostly limited to rugæ. Surface diphtheritic; walls of the jejunum natural. (Taylor, *Guy's Hosp. Rep.*, 1868, xiii. p. 233.)

CASE XLII. Male, aged 50.—*Dose and preparation taken.* Injection into piles (internal) of a "liquid composed partly of carbolic acid." Had used on two occasions before with success, five weeks before the present one.—*Symptoms.* 11 A. M. Felt at once "uncomfortable." 4 o'clock, had a chill, with nervous distress. Passed a bad night; sleeplessness; nervous distress; insupportable giddiness and strange feeling about the head. 6 A. M. treatment for carbolic-acid poisoning commenced. Afternoon, "nervous chill, although warm;" weak, irregular pulse; giddiness, and impending convulsions. Giddiness continued for three days.—*Treatment.* "Eliminative character, with the bromides in addition."—*Result.* Recovered. (Wright, *Cinn. Lan. and Clin.*, Aug. 1878, p. 68; vol. i., New Series.)

CASE XLIII. Female, aged 22.—*Dose and preparation taken.* ℥ss Calvert (No. 4). Patient just recovering from a second attack of relapsing fever. Took poison at 4.15 A. M. on September 17th.—*Symptoms.* 5 minutes, complete unconsciousness; conjunctival reflex gone; pupils normal and insensitive to light; surface livid, clammy; perspiration, copious; extremities cold; respiration husky, with considerable mucous rattle; occasional moaning. Pulse shaky, feeble; no whiteness or unusual appearance about the lips. Power of deglutition gone. 5.30, pulse improved. 7.30, able to swallow. 8.30, greatly improved; pulse 108, soft and feeble; lividity gone; body warm, but clammy. 12.30, passed green-black urine; vomiting; stools light-coloured and offensive; looseness of bowels. 18th, urine more clear and light. 19th, symptoms double basic pneumonia. Pulse ranged between 108 and 130 until Oct. 13th, when she suddenly became worse and died at 9 A. M.—*Treatment.* ℥j brandy and milk enema; with stomach tube, gave in course of half hour Oj and ℥iss brandy. Fomentations to abdomen; hot bottles to feet.—*Result.* Died.

Autopsy and Remarks. Autopsy: The woman had double pneumonia, which the author attributes to the effects of the acid. (Tennent, *Glasgow Med. Journ.*, 1870–1, p. 74–78.)

CASE XLIV. Male, adult. Acute eczema.—*Dose and preparation taken.* One part of carbolic acid to four of lard applied on lint to arms and thighs, and covered with oiled silk.—*Symptoms.* In an hour and a half "profound coma; pupils firmly contracted; breathing stertorous; pulse weak, quick, flickering; inability to swallow.—*Result.* (?) (*Canada Med. Journ.*, 1871, vii. p. 8; quoted by Tennent.)

CASE XLV. Male, aged 32.—*Dose and preparation taken.* ℥ss in the oily state.—*Symptoms.* Five minutes, insensible; face livid; bathed in profuse, clammy perspiration; eyes open and turned up; pupils contracted and do not respond to light; mouth open, filled with frothy mucus; respiration stertorous; pulse imperceptible; heart sounds scarcely audible; forced to swallow raw eggs and ℥vj mustard water—vomited; could not pass tube on account of stricture of œsophagus.—*Treatment.* Raw eggs, mustard water, galvanic current, and artificial respiration; by stomach tube large quantities of soap, lime-water, olive oil, flaxseed mucilage, and fluids were given; also counter-irritation.—*Result.* Died in one and a quarter hours.

Autopsy and Remarks. Eighteen hours after death: Rigor well marked; blood dark and fluid, smelt strongly of carbolic acid; venous system greatly congested; membranes of brain congested; sinuses all filled with dark blood; mouth, pharynx, and œsophagus whitened; stomach contained about ℥viij chocolate-coloured fluid, mucous membrane chocolate coloured, roughened, and charred, and in some places completely destroyed, exposing the muscular layer, and everywhere readily detached; destruction mostly near cardiac pouch; the pylorus thickened, and velvety to the touch; discoloration and destruction continued through the duodenum, fading along small intestines; whole alimentary tract highly congested; heart flabby and empty; lungs highly congested; bronchi contained frothy mucus; kidneys and liver congested. (Houston, *Med. and Surg. Rep.*, 1870, xxii. p. 32.)

CASE XLVI. Male, aged 23.—*Dose and preparation taken.* Probably a good swallow of the impure—"not likely more than an ounce."—*Symptoms.* Two

minutes: insensible, pulseless; pupils dilated; face pallid and pinched; respiration gasping; involuntary discharge of urine; respiratory interval prolonged; heart ceased; then the respirations.—*Result.* Died in about three minutes, not more.

Autopsy and Remarks. Stomach moderately distended, intensely congested; externally being of a dark venous hue; contained Oj of whitish-coloured liquid, smelling strongly of carbolic acid; mucous membrane has a white film, and beneath this was congestion and a chocolate coloration; the membrane was strongly corrugated, thick, higher and more rigid than normal, especially marked at cardiac extremity, and along the greater curvature, and in lower end of œsophagus. Scalp and meninges congested, and vessels filled with dark fluid blood. (Taylor, *Phil. Med. Times*, 1873, ii. p. 284.)

CASE XLVII. Male, aged 48.—*Dose and preparation taken.* Gr. v of crystals in ʒij water.—*Symptoms.* Immediately experienced burning in the throat and stomach; vertigo; nausea, with retching, but could not vomit; paleness; hyperæmia of fauces; pulse 90; cold and nervous (gave lime-water, tartar emetic, and ipecac); no vomiting; nausea and vertigo; giddiness continued for eight hours, when emesis occurred, which relieved his nausea; but the vertigo trouble persisted until the following day.—*Treatment.* Lime-water, tartar emetic, and ipecac.—*Result.* Recovered. (Winslow, *Phil. Med. Times*, 1874, iv. p. 817.)

CASE XLVIII. Aged two years.—*Dose and preparation taken.* ʒij Calvert, No. 4.—*Symptoms.* Immediately screamed; drank ʒiv lime-water, ʒj olive oil, then insensibility supervened; ten minutes, profound coma; tactile sensibility totally abolished; surface pallid; copious perspiration; limbs flaccid; eyelids closed, bluish; pinched expression; frothy saliva. Pulse (160) soft, feeble, irregular; respiration (70) laboured, irregular, jerking, stertorous, and hissing; mucous membrane of tongue and fauces white, with patches of marginal streaks of capillary injection. Pupils widely dilated, and do not respond to light. Oil placed in pharynx immediately rejected, attended with suffocative symptoms. Apomorphine given occasionally; shudder, followed by slight clonic convulsions; prolonged spasm of glottis causing deep cyanosis. Any attempt to clear the mouth, or to give anything, excited dangerous spasm of glottis and general convulsions. A prick of a pin would cause the same thing. In the course of a couple of hours consciousness returned, and he took considerable powdered chalk and sugar, white of egg, iced port wine, and milk. Died with meningitic symptoms.—*Treatment.* Lime-water and olive oil; apomorphine.—*Result.* Died in twenty hours. (Winslow, *Ibid.*)

CASE XLIX. Female, aged 20.—*Dose and preparation taken.* A hundred and forty-five grains in glycerine as an enema for ascarides.—*Symptoms.* She rapidly became convulsed, delirious, and finally nearly or quite insensible; surface cold and moist; pulse weak and flickering; pupils contracted; breathing stertorous.—*Treatment.* Injection of milk, and rectum thoroughly washed; ammonia, camphor, and diffusible stimulants given by the stomach.—*Result.* Recovered. (Pinkham, *Med. and Surg. Rep.*, xix. 1868, p. 492.)

CASE L. Female, aged 29.—*Dose and preparation taken.* Half teacupful of carbolic lotion.—*Symptoms.* Vomiting soon began, accompanied with drowsiness; pupils natural. No drugs given. Free from symptoms next day. Urine a deep brown colour.—*Result.* Recovered. (*St. George's Hosp. Reports*, 1879, p. 25.)

CASE LI. Male, adult.—*Dose and preparation taken.* Drank from a jug in mistake for whiskey.—*Symptoms.* In three minutes unconsciousness; no noticeable symptoms outside of the feeble, fluttering pulse, and frothing at the mouth. —*Result.* Died.

Autopsy and Remarks. Œsophagus contracted, and shows well-marked longitudinal folds; surface smooth, and of a peculiar bright, slightly yellowish-white colour, "closely approaching that of freshly-pulled molasses candy;" stomach strongly contracted, and summits of rugæ marked with white lines, and in interstices were found granular detritus. (Harris, *Boston Med. and Surg Journ.*, 1880, i. p. 494.)

CASE LII. Female, aged 40.—*Dose and preparation taken.* "One or more swallows, ninety-five per cent. acid"—"at least ʒij entered stomach."—*Symptoms.* Five minutes: comatose; respiration stertorous; pupils contracted and

insensible; profuse perspiration. (Tartar emetic failed to produce emesis.)—*Treatment.* Tartar emetic, lime-water, and olive oil freely.—*Result.* Died in three hours. (Park, *Chicago Med. Gaz.*, 1880, i. p. 228.)

CASE LIII. Male, adult.—*Dose and preparation taken.* Lotion to necrosed tibia.—*Symptoms.* Pulse very feeble and flickering; respiration difficult; pale and anxious; feet and hands cold. (Wineglassful of brandy.) In three or four hours patient felt better, but a little nervous. (Opiate.) Urine next day smelt strongly of carbolic acid.—*Result.* Recovered. (White, *N. Y. Med. Gaz.*, 1871, p. 274.)

CASE LIV. Male, aged 20.—*Dose and preparation taken.* ℥j pure fluid carbolic acid.—*Symptoms.* First swallowed milk, raw eggs, glycerine, and mustard; then inability to swallow. Half hour after poisoning, comatose condition; uneasiness, except when aroused; short, laborious, somewhat stertorous respiration; coolness, lividity, perspiration; feeble, almost imperceptible pulse.—*Treatment.* Forced down milk through tube. Pumped out the contents of stomach, and forced in milk and sweet oil, and pumped out again, and repeated.—*Result.* Recovered.

Remarks. Vomited when recovered from coma. Felt as well as usual next morning, except a slight burning in the stomach. (Glisan, *Amer. Journal of Med. Sciences*, 1880, lxxx. p. 452.)

CASE LV. Female, aged 13.—*Dose and preparation taken.* ℥ij pure carbolic acid. Water immediately given; then emetic, with no effect.—*Symptoms.* In three minutes unconsciousness; seven minutes "radial pulsation gave way;" eight to twelve minutes tonic spasms, mainly of flexors; breathing slightly stertorous. —*Treatment.* Enema of brandy and milk, and stimulating applications.—*Result.* Died in nineteen minutes.

Autopsy and Remarks. Considerable corrosion of mouth and throat. (Sigler, *Louisville Med. News*, 1880, ix.-x. p. 294.)

CASE LVI. Male, aged 24. Had herpes on right side, extending from nipple to axilla, about five inches square.—*Dose and preparation taken.* Painted the herpetic part with a saturated solution of the acid.—*Symptoms.* Twenty minutes, faint, dizziness, weakness in legs, and symptoms of collapse. Symptoms lasted for half an hour.—*Result.* Recovered. (Paul, *Phil. Med. Times*, 1880, x. p. 404.)

Besides these cases, there have been reported seven others in English journals to which I have not had access: Cleaver (*Liverpool Med. Surg. Rep.*, 1871, v. 45); Wood (*Ibid.*, p. 110); Maloney (*Australia Med. and Surg. Journ.*, 1872, xvii. p. 73–77); Allen (*Ibid.*, 1880, ii. p. 116); Peters, (*Indian Med. Gaz.*, 1863, viii. p. 423); Sheddon (*Glasgow Med. Journ.*, 1872, v. p. 266); Woodham (*Virginia Clin. Record*, 1871–2, i. p. 272). There are also to be found a number in journals of other languages.

Superficially reviewing the general symptoms of carbolic acid poisoning presented by the above cases, we find that the poison is absorbed with great rapidity, and the evidences of its toxic properties are soon manifested. In the course of a few minutes they become so rapidly aggravated that the system is profoundly affected; and, indeed, at least two cases offer good illustrations of its acting with the same deadliness and frightful rapidity as have been noted in cases of poisoning from the more virulent hydrocyanic acid. In cases which have been under observation from the time of the ingestion of the poison, symptoms have been observed to appear almost immediately, which indicate that the acid finds its way into the circulation as soon as it comes in contact with an absorbent surface, whether it be the skin, stomach, rectum, pulmonary acini, or wounds.

The first symptom generally appreciated is a burning pain in the parts of the body with which the acid has come in contact, provided the acid has been of sufficient concentration; in some cases, however, no pain is experienced and

even a diminution of sensibility may be present. Disorders of cerebration are then likely to follow, as evinced by a confused condition of thought, difficulty of speech, depression, restlessness and bewilderment, vertigo, delirium. Insensibility is one of the most frequent, earliest, and constant of the phenomena, but occasionally it does not make its appearance until late. Nausea and vomiting may be present, but this does not occur in more than about twenty per cent. of the cases. Uncontrollable vomiting occurred in one case, while in another it was very severe, and in a third was moderate. Even drugs seem to have but little power to bring about emesis, for in about twenty per cent. of the cases in which the different emetics were given, vomiting occurred only in about one-half of them. The pulse and respiration, like the nervous system, are seriously affected. The former in a large percentage of the cases becomes feeble, frequent, and intermittent, but in very exceptional instances was slow and weak. The respiration was soon affected, and in more than half of the cases, where it was particularly noted, was stertorous to a greater or less degree, but generally well marked; and in rare instances is described as being dyspnœic, slow, husky, or hurried. Occasionally the face is flushed, but more often a paleness is present. The skin is exceptionally hot and dry, and in a larger portion of cases is cold and clammy—especially noticeable in the extremities; and in a single case a hot skin was followed by coldness.

Lividity, more or less marked, is a frequently noted symptom; salivation was also observed. The temperature was stated to have risen above the normal in three cases, while in two it was lowered, and in a sixth case was natural. Frothing at the mouth and nose occurred in about ten per cent. of the cases, and deglutition was difficult in five and impossible in ten. In four the odour of the acid was detected in the exhalations. In ten cases the urine was noted as being coloured greenish, blackish, or brownish. Relaxation of the bowels was also occasionally noticed, and the stools in several instances were described as being brownish, blackish, or greenish. The pupils were variously affected, but in over half of the cases in which they were specially examined were found to be contracted; in less than a fifth they were dilated; in four were unaffected; in two dilatation was followed by contraction; and in another, there was first dilatation, then contraction, and ultimately dilatation. Convulsive movements occurred in fourteen cases; in one they were violent; in three were mere twitchings, and in a similar number trismus was present. In one case epileptiform convulsions were present, but this patient was stated to have been an epileptic, and in another case impending convulsions were recorded; sometimes they are only facial. Anæsthesia was also recorded in about fifteen per cent. of the cases, but was undoubtedly present in the vast majority where insensibility was recorded to signify this condition together with a loss of consciousness. Protrusion of the eyeballs, pain in the head or back, hiccough, muscular weakness, tremors, thirst, harshness of

voice, and involuntary micturition were also exceptionally noted. Symptoms of pneumonia, pulmonary congestion, or of meningitis, or mucopurulent expectoration, were observed in six cases.

Pain in the mouth, œsophagus, and stomach, frothing at the mouth or nose, insensibility, difficult or impossible deglutition, a cold and clammy skin, stertorous respiration, a frequent, small, and intermittent pulse, contracted pupils, anæsthesia, and a brownish, blackish, or greenish urine are the most constant and characteristic symptoms, and the latter is probably pathognomonic.

Experiments made on the lower animals yield results in accordance with the symptoms produced in man. According to Lemaire (*De l'Acide Phénique*, Paris, 1865), Neumann (*Archiv f. Derm. u. Syph.*, i. 1869, p. 425), Labbée (*Archiv. Gén. de Méd.*, 1871, p. 45), Stone (*Phila. Med. Times*, ix., 1878–9, p. 616), and Salkowski (*Pflüger's Archiv*, Bd. v., 1872), toxic doses in frogs produce paralysis of the posterior extremities followed by paralysis anteriorily, and of the whole muscular system. Lemaire states, however, that when frogs are placed in aqueous solution the anterior extremities are first affected. On the mouse and rat, Kempster (*Amer. Jour. of Med. Sciences*, July, 1868, p. 37) found that when they were confined to a jar and a sponge suspended a short distance from the bottom impregnated with the acid and the animal compelled to inhale the vapour, well-marked symptoms of poisoning rapidly occurred. The mouse in five minutes staggered as if intoxicated and then grew better. These paroxysms recurred several times during an hour and a half, when the animal became convulsed and died. A rat, in less than a minute, appeared sleepy, and as if intoxicated, muscular weakness was also apparent. In three-quarters of an hour it failed to notice sounds, and shortly after, to all appearances, was in a state of profound anæsthesia. Tremors, convulsions, and death followed. Two other experiments on rats confirm these results. In pigeons, according to Husemann (*Schmidt's Jahr.*, Bd. clv. p. 274), the same characteristic results occur as in mammals. Salkowski (*loc. cit.*), Neumann (*loc. cit.*), Lemaire (*loc. cit.*), and Husemann (*loc. cit.*) found in rabbits and dogs, tremors, muscular weakness, slowing of the respiration, dyspnœa, salivation, dilated pupils, diminished sensibility, convulsions, and death. Before convulsions rabbits lie on their sides kicking in mid-air. Temperature is diminished, and, according to Husemann, hæmaturia and albuminuria are occasional phenomena. A very curious fact was also noticed in frogs that, after awhile, violent convulsions were induced by very slight irritation; and at times when the posterior extremities were paralyzed, the anterior remained in a state of exalted reflex excitability (Stone, and Bert and Jolyet).

The *nervous system* is profoundly affected, and the train of symptoms following the action of the acid on this portion of the economy is decidedly well marked. *Convulsions* in the lower animals are more prominent phe-

nomena than in man, and are almost constant symptoms. Husemann states them to be one of the characteristic phenomena; but in man in less than about one-third only of the above cases were such movements present, and in only one were they at all violent. The convulsions are generally clonic, but may assume a decidedly tetanic character. That they are not peripheral seems proven by the experiments of Salkowski, Labbée, and Stone, for these observers found that they did not occur in the extremities which had been deprived of their central nervous connections by severing the nerves going to them; although they did occur when the limb was protected from the poison by ligaturing the bloodvessels. It is, therefore, certain that they must be central in their origin. Salkowski, Bert and Jolyet (*Gaz. Méd. de Paris*, 1872, xxvii. p. 188, etc.), and Stone (*loc. cit.*) found them occur in animals with cut cords, and hence they concluded that the convulsions were of spinal origin. These results, however, are not in accord with those of Labbée and Haynes (*Phila. Med. Times*, 1874, iv. p. 407), who state that convulsions did not occur in animals thus operated upon. From the disparity in these records it would seem that these phenomena are both spinal and cerebral in their origin, or else the former investigators did not completely sever the cord in the animals operated upon. Labbée removed the optic lobes and cerebri of animals, and found the convulsions still occurred when the basal ganglia were irritated, so that if the convulsions are exclusively cerebral they must, undoubtedly, if these results are accurate, be due to an action on the centres at the base of the brain; and the presumption that they are probably cerebral seems to be strengthened by the fact of their clonic character, yet the occurrence of a tetanoid-paralysant condition in frogs after they are profoundly under the influence of the poison suggests that these convulsions are dependent upon a similar action to that which produces like phenomena in the poisoning by atropine, apomorphine, and strychnia,[1] and hence, must be of spinal origin. Labbée does not give the details of his experiments; and Haynes used such large doses that it seems readily explainable why he observed convulsions anteriorly only; for, as above noted, the anterior extremities may be in a state of exalted reflex excitability while the posterior are paralyzed; and, moreover, when paralysis occurs it attacks the posterior extremities first—indeed, large doses may immediately cause general paralysis. When we consider the excessive doses used by Haynes (ʒij–ʒiij liquefied acid), it seems clear that the reason why he did not get convulsions posteriorly was because these large doses brought about an immediate condition of paralysis in the posterior extremities, with an attendant condition of hyper-excitability anteriorly. If, as before noted, we have a coexistent condition of paralysis and convulsions as has been described by several observers, it must be clear that if convulsions did not occur in the

[1] Reichert, Phila. Med. Times, 1881, p. 711.

posterior extremities, after section of the cord, unless the section was made during the convulsive stage, a negative result would be of little value as proof that convulsions were cerebral; while a positive result, such as obtained by at least three experimenters, would be very weighty in proving their spinal origin, and especially so, since the experiment was performed many times by a single investigator with the same result. It is extremely improbable that in every one of these experiments in which section of the cord was made it was incomplete.

Reflex action, according to Labbée (*loc. cit.*), is not lost, but he gives no details of experiments. Stone, in a very careful investigation of this function, obtained very decided results, and found that reflex action in frogs was primarily diminished and secondarily increased,[1] and that large doses may cause a decided exaltation. He also found that after section of the cord in the dorsal region hyperexcitability in the posterior extremities was not induced, nor was the diminished reflex activity present in the early part of the experiment as before; he therefore concludes that the diminished reflex irritability, as well as the increase, was due to a stimulation and ultimately to a depression of Setschenow's inhibitory centres in the base of the brain. This, however, appears to be inaccurate because after section of the cord convulsions occurred which were induced by slight stimuli, and consequently there must be some other reason for this condition of reflex excitability besides a depression of these centres, and it is probable that this exaltation is due, in part at least, to a depression of spinal reflex inhibitory centres which are similar in their function to Setschenow's. Late in the experiment, when the sensory function appeared to be highly exalted, the motor function was decidedly diminished, and Stone thinks that these phenomena were, like those of strychnia poisoning, due, as Kölliker suggested, to the excessive strain on the motor nerves; yet, this can scarcely be true if his own statement, as well as those of Salkowski (*loc. cit.*) and Hoppe-Seyler (*Pflüger's Archiv*, 1872, Bd. v.) be correct: that the motor and sensory nerves and muscles are not materially affected; and then again it is exceedingly improbable that the depression of the motor nerves in strychnia poisoning is due only to excessive strain, as we have much proof to show.

From the above results it seems evident that the toxic influence of carbolic acid in the production of convulsions and on reflex phenomena, is entirely centric. Stone (*loc. cit.*) found that when he could induce no reflex movements by irritating a sensory nerve, irritation of the cord produced marked movement in the posterior extremities; and he therefore concludes that the spinal action is probably confined to the motor columns. If this is so, the phenomenon of a consentaneous existence of exalted sensibility and motor depression is readily explainable in the

[1] See Case XLVIII. for similar symptoms in man.

fact that both conditions are due to paralysis; the exalted sensibility to a paralysis of reflex inhibitory centres,[1] and the motor depression to a paresis of the motor columns of the cord.

The *cerebral* functions are early and seriously affected, the first symptoms, as at times observed, being restlessness, bewilderment, hesitancy of speech, depression of spirits, and delirium, stupor, insensibility, and coma.

The action of the acid on the *circulation* has not been thoroughly studied. Hoppe-Seyler (*loc. cit.*) found that the arterial tension was not materially affected until convulsions were present, when it was decidedly increased, remaining in this condition for a prolonged period, and then gradually falling and continuing in a decline until it reached a point far below the normal. Salkowski and others found that the heart after death was arrested in diastole, and that this condition existed whether by slow or rapid poisoning. In man the heart generally presents strong evidence of the result of a decided and direct poison, and is to be found in a pale, flabby, and distended condition; although in several instances the left side especially was found to contain but little blood, and in at least one case this viscus was described as being healthy and empty. The increase of arterial pressure as observed by Hoppe-Seyler would seem at first sight to be dependent upon the convulsions, but Lemaire's and Salskowski's experiments seem indicative that there are other features present, for the former observer states that the systoles in the early part of the poisoning are increased in their power, and that the arterioles can be seen to contract; Salkowski declares that the rapidity of the blood-current in the capillaries is primarily increased and afterwards diminished. While there can be no doubt that carbolic acid acts ultimately as a direct and decided cardiac depressant and causes death very frequently, if not in the large majority of cases, in this way, yet the results of the above experiments are such as to preclude any decisive opinion until a further research is made. The frequent, feeble, and intermittent pulse, so frequently noticed in man, is strong evidence of a decided depressant action on the heart, as is also the slow and feeble pulse, which, at times, has been noted.[2]

The *respirations* in the earlier stages of the poisoning are decidedly increased in frequency, but later they are deep, slow, and laborious, and possess a marked stertorous character. According to Salkowski, the frequent respirations are very shallow and are almost entirely costal in their character, the diaphragm taking but little part. It was also found that respirations were accelerated in animals with cut pneumogastric nerves; and, furthermore, in normal animals, when the vagi nerves were cut dur-

[1] For a discussion of "Convulsions due to Depression of Spinal Reflex-Inhibitory Centres," etc., see my paper in *Phila. Med. Times*, Aug. 13, 1881, p. 711.

[2] Several experiments which I recently performed in connection with the blood-pressure, indicate that large doses of the acid, intravenously injected, cause an immediate cardiac paralysis.

ing the existence of frequent respiration, the movements became decidedly slowed, and were deep and regular. These results indicate both a centric and peripheral action, and that the altered respirations are due to a stimulation of both the pneumogastric peripheries and centres, while it is probable that the diminished respiratory movements, which occur later in the poisoning, are due to a paralysis of the same.

The *pupils* in the above case were more often contracted, but no experiments have been made on animals to determine how this action was brought about.

The *temperature* change in man is variable, as we have already seen, and in animals it has been stated to be diminished; according to Erls (*Schmidt's Jahr.* Bd. clxiv. p. 148), the acid diminishes the heat in animals in which fever was produced by injecting putrid substances. Latrobe and others found that carbolic acid causes changes in the blood-corpuscles out of the body; although no change was found to occur in the blood in the economy.

The *local action* of the poison is that of a decided irritant and caustic, for when applied to the living tissues it induces swelling, redness, and, generally, severe burning pain, which is followed by a white eschar and a loss of sensibility in the part. When applied to the skin the eschar becomes dried and translucent, presenting the appearance of being cornified. The same change has been observed by Taylor (*Guy's Hospital Rep.* 1868, xiii. p. 233) to occur in the mucous membrane of the stomach. This gentleman states that the superficial layer of the stomach mucous membrane was destroyed, and the dead part showed all the structures perfect, and they were rendered sharp in outline by a sort of cornification which had taken place, and that no inflammatory process existed. The loss of sensibility is not confined to the circumscribed tissue directly destroyed by the acid, but extends to at least an appreciable depth.

When swallowed, the mouth, throat, and œsophagus are whitened and present the appearance of being covered with a whitish, grayish, or brownish pseudo-membranous substance, which is soft or pulpy or diphtheritic, and easily detached from the underlying structures, which are then found to be in various stages of congestion, and frequently described as having a chocolate colour. The œsophageal mucous membrane is sometimes spoken of as being thickened, hardened, rigid, and corrugated.

The *gastric mucous membrane* is seldom affected throughout, and as might be expected the most formidable lesions are to be found in those portions which the acid would reach in its most concentrated condition; consequently, the cardiac end and the greater curvature are the most to suffer.

The stomach walls may so far be disorganized, that portions of the muscular coats are reduced with the mucous membrane to a pulp. The latter is generally found to be corrugated, congested, and corroded, and

covered with a pulpy or diphtheritic substance which may be of a whitish, grayish, or chocolate colour. The membrane is sometimes described as being thickened, tougher, more rigid, blackened, sodden, or chocolate-coloured. The summits of the rugæ have been observed to be whitened, while the interstices were red, and contained granular detritus; by another writer, elevated points about the size of shot, without any very marked congestion, were reported; and by still another, red-based patches, with well-defined borders, limited more particularly to the rugæ, were noted. The microscopical appearances of the mucous membrane have already been quoted from Taylor's paper (*loc. cit.*).

The *stomach* may be contracted or dilated, or be found in an intermediary condition. The amount of fluid it contains is variable, as is also its nature, for it may be of a whitish colour, or pinkish, brownish, or chocolate-coloured; may vary greatly in its consistency; and may possess in a greater or less degree the odour of the acid.

The occurrence of nausea, retching, and emesis, or the utter impossibility of inducing these phenomena by giving emetics by the stomach, seems readily and satisfactorily explained when we consider the irritant and corrosive properties of the acid; and at the same time that emesis may follow a local application of the acid to an absorbent surface. When the acid first reaches the gastric mucous membrane it at once irritates the peripheries of the vagi nerves, and, whether we have vomiting following the irritation, or whether the irritation is too quickly superseded by a physiological destruction of the nerve peripheries, is obviously determined by the relation existing between the rapidity with which the irritant effects are followed by those of a caustic character. That the peripheries of the pneumogastric nerves are soon seriously affected and functionally destroyed, is corroborated by the fact of the great difficulty or even impossibility of inducing emesis by drugs which effect this phenomenon by a direct local irritant action. Yet emesis, or the failure of the drug to induce it, cannot always be due to a local action only, unless it is dependent upon an effort of the system to eliminate the poison through the gastro-intestinal tract, for vomiting supervened in some of the above cases after a local application of the acid to absorbent surfaces such as the skin, wounds, rectum, etc. It is, therefore, probable that the emesis is, in part at least, centric, the drug acting in small quantity as a stimulant to the vomiting centres and in larger ones as a depressant.

What becomes of carbolic acid in the system, and the condition in which it is absorbed, are interesting questions which we are unable to answer. It has been suggested, since it possesses the property of coagulating albumen, that it is absorbed in some combination. Its presence in the blood can be a matter of but little doubt, since in autopsies the odour of the acid was frequently very strong and distinctly perceptible in the different viscera. Lemaire (*loc. cit.*) believes that it is *eliminated* to a considerable extent by the lungs, for he found the odour on the breath of

dogs and rabbits very perceptible; and we have instances of the elimination of the drug by this channel in at least four of the cases of poisoning in man. The lungs are certainly not the only channel by which elimination takes place, for Hoppe-Seyler (*loc. cit.*) found it in the saliva, and Salkowski (*loc. cit.*) and numerous other observers have found it in the urine, but in what form it is eliminated is a matter of much doubt. Patrouillard (*Jour. de Pharm. et de Chem.* 1871, p. 459) states that he obtained an oily liquid by means of ether which reacted to the characteristic tests, and which he thought to be pure acid; yet Salkowski believes that it exists as an alkaline carbolate.

The *urine* in over 20 per cent. of the cases was noticed to be coloured, and in eight of them was described as being smoky or brownish; in one it was a green-black, another had a violet tint by reflected light, and another was at first an olive-green, but became black and smoky on standing. Albumen was noted as occurring in a single instance.[1] The urine may or may not smell of the acid, or have a peculiar mixed or aromatic odour, and has been noted in exceptional instances to be bloody, copious, scanty, more acid, loaded with lithates, or to present a normal appearance. The coloration may make its appearance within a couple of hours and last for several days, and at times it can only be distinctly perceived when the urine is held up to the light.

The cause of the coloration appears to be still invested in much doubt, and it has been suggested that it is the result of the destruction of a part of the carbolic acid in the system and the consequent formation of an oxidative product—for it will be remembered that when the acid and potassium permanganate are brought in contact the former is oxidized and oxalic acid results—which is eliminated by the kidneys, and this fact seems to be strengthened by the researches of Salkowski, who found, as already stated, that oxalic acid appears in the urine of animals poisoned with carbolic acid. Husemann at first believed that the hæmoglobin was the cause of the colour, but he afterwards abandoned this theory because of the urine fully clearing up, after acidifying, and then heating, and especially because the odour of the acid was given off during the former process. Husemann, besides other observers, could detect no corpuscular elements of the blood in the urine; nor was there an excess of iron present. Waldenström and Almèn (*Zeitschrift Allgem. Apoth. Verein*, Jan. 1872), in a later series of experiments with similar urine, obtained, by adding sulphuric acid and then distilling, a product smelling strongly of carbolic acid, and which responded to the calcium chloride with a blue colour; and, moreover, when the product was shaken with ether, the latter left, on evaporation, drops of the acid. Similar results were obtained by Städeler (*Ann. d. Chem. und Pharm.* Bd. lxxvii. p. 17) with the normal urine of the cow by a similar

[1] Albumen is reported as being found in a case reported by Waldenström and Almèn.

process; and these results have been corroborated by Buliginsky (*Med. Chem. Untersuch.* 1872, p. 234), and Hoppe-Seyler (*loc. cit.*). The latter observer has, however, shown that the acid does not exist in the normal urine, but that the substance thus obtained is probably a product of the decomposition of indican; a fact which seems to be strengthened by the researches of Salkowski (*Centralb. f. Med. Wissensch.* 1876, p. 820), who found in cases of ileus an increase of the substance from which the acid is formed *pari passu* with the onset of the trouble; consequently, experiments of Waldenström and Almèn do not, therefore, prove that the acid they found was eliminated by the kidneys. There can be no doubt, however, but that carbolic acid does exist in the urine in cases of poisoning, as the odour as well as the reaction to characteristic tests signify; yet there must also be some new products formed, because the carbolic acid urine when subjected to nitric acid, and afterwards potassium hydrate, and then concentrated, gives a blood-red followed by a pea-green and violet colour. Carbolic acid added to the urine outside of the body will not yield this play of colours (*Schmidt's Jahr.* Bd. clxiv. p. 144). Microscopical examinations reveal carbonaceous particles, and it is difficult to determine whether the particles have anything to do with the characteristic test as given above or not, although it seems that they are the probable cause of the coloration, and possibly the factor upon which the reaction depends. Bauman and Herte have found that the sulphates disappear from the urine very early in the poisoning.

The *kidneys* in animals, according to Neumann, are found to be in a state of fatty degeneration. This is contradicted by the results of Salkowski's researches; but Rendu and Patrouillard's case (Case IX.) adds confirmatory proof to Neumann's assertion.

The *venous system* seems to be in a state of general dilatation, and as a consequence the different viscera and glands have been found in various degrees of congestion. The *membranes of the brain* are more frequently spoken of as being congested and full of dark fluid blood, and as an exception have been found natural. The *brain* is generally described as appearing healthy. The *arachnoidean fluid* has been found increased in some cases, and the odour of the acid has been detected in the cranial cavity.

The *lungs* are often described as being congested, and especially so in the most dependent portions. The bronchi have been noted to contain mucus, which may appear bloody or as a dark-red fluid; œdema and emphysema are exceptionally recorded. In at least three instances the lungs have been found healthy; and in one, the left lung was congested and the right emphysematous. A double-pneumonia was developed in Tennent's case (Case XLIII.), which he attributes to the effects of the acid. This is in accord with the statements of Lemaire, who found pneumonia occur in animals thus poisoned.

The *blood* in a vast majority of the cases is found to be dark and fluid, and in exceptional instances to contain soft coagula, and in one was everywhere firmly coagulated. In one case it remained fluid for five days, and in another it became bright red on exposure to the air. The odour of the acid has not unfrequently been detected in the fluid.

The asphyxiated condition, as can be surmised from the results of experimentation on animals, must be due to a paralysis of the pneumogastric apparatus; for it can scarcely be dependent, to any extent, upon changes in the blood disks, because no alterations are revealed by microscopical examination, and besides the blood possesses the power of becoming arterialized when exposed to the air after death (Brabant), which shows that the hæmoglobin was not destroyed, nor its ozonizing power paralyzed. The venous condition of the blood must then be due to a failure of the pneumogastric nerves and centres to properly carry on the respiratory function, and probably in part to the congested condition of the lungs and the depression of the circulation.

There are many difficulties in the way of satisfactorily accounting for the fluid condition of the blood on mere theoretical grounds, because excessive carbonization of this tissue seriously affects its coagulating property; yet, since we are aware of the power of the acid to coagulate albumen, it may be that it exerts some destructive influence on the fibrin-forming proteids.

The smallest *dose* which proved fatal in any of the above cases was one drachm, in a man of 64, and who died in twelve hours; yet two children, one of two and the other of two and a half years, who had each taken the same quantity, recovered. The largest dose taken was by a woman of 35, who drank something less than eight ounces; a half an ounce is almost invariably fatal, yet a case has recovered after the ingestion of four ounces, and another after taking an ounce. The most frequent dose was from a half an ounce to an ounce. Death occurred in nine cases in less than an hour; in one within three minutes, and in four others in less than twenty minutes. Life may be prolonged for twenty-four to forty-eight hours, or longer; but death usually occurs within the first four hours. Death ensued in one case in twenty minutes, from the effects of an enema for ascarides. Davidson (*loc. cit.*) cites a case where seven drops caused alarming symptoms; and in another case, above quoted, five grains elicited well-marked symptoms of poisoning.

The number of fatal cases which have followed the external use of the acid in cutaneous affections, shows that its use, to any considerable extent, in these diseases is not altogether unattended with great danger. Deaths have occurred following its application in cancer of the cervix, and most alarming symptoms have supervened from its use as a lotion in necrosis, or as an injection in abscesses or piles; and we have at least one authenticated case in which death nearly occurred from the inhalation of its fumes.

The experiments of Kempster (*loc. cit.*) on animals, well illustrate the facility with which the pulmonary mucous membrane can absorb this vapour. About one-half of the cases proved fatal when the acid was drunk or used as an enema, while a large percentage recovered in which the poisoning ensued from its local or other use. Cerna (*Phil. Med. Times*, 1879, p. 592) found the minimum fatal dose in rabbits to be fourteen and one-eighth minims per pound, and in dogs eight and four-sevenths minims per pound; certainly a much higher ratio than in man.

The frightful rapidity with which *death* occurs in some cases suggests that it must have been due to shock, such as occurs after the ingestion of sulphuric acid and similar corrosive poisons; but in the other cases where dissolution does not take place for some time it is undoubtedly dependent upon a progressive paralysis of the vital centres. Taylor (*Phila. Med. Times*, *loc. cit.*) believes that his case probably died from the effects of a paralysis of the pneumogastric and sympathetic nerves which brought about a cessation of function of all the important organs; while others suggest that it may be due to a failure of the heart, asphyxia, or shock. Judging from the symptoms during the poisoning and results of autopsies, there can scarcely be a doubt but that death is usually and directly due to asphyxia or an arrest of the heart or both. In animals the heart is not arrested until the cessation of the respiration, unless the acid be injected into the veins or given in very large quantities; still, there can be no doubt, when the condition of the pulse during life is considered, as well as the strong evidence in the appearance of this organ after death, of the powerful paralyzing action.

The *diagnosis* of carbolic-acid poisoning in most cases should not be attended with difficulty, for the characteristic odour of the drug can generally be detected; and in conjunction with the white or brownish stains about the mouth, and with the most characteristic symptoms as already noted, would almost be conclusive evidence; and, especially so, if the peculiar discoloration of the urine be present. After death the lesions are pretty well defined, and the odour of the acid can generally be distinctly detected in the blood and viscera. The danger of confounding these cases with apoplexy, uræmic coma, and similar conditions must be borne in mind.

The *treatment* pursued was generally such as would be indicated in cases of poisoning by corrosive substances of this nature: emetics, the use of the stomach-pump, olive-oil, milk, eggs, sodium bicarbonate, magnesia, lime-water or chalk, stimulants, counter-irritants, warmth, etc. Bleeding was practised in one case, and as curious and interesting as it may be, the patient recovered. The emetics used were of but little avail, both on account of the inability or difficulty of the patient to swallow, and the disorganized condition of the gastric mucous membrane.

Considering the difficulty of introducing emetics into the stomach, and the disorganization which has taken place in its mucous membrane, it must

be certain that where we have a choice of emetics one should be selected whose action is on the vomiting centres, and which can be used hypodermically—not one which induces emesis by a local irritant action. We cannot hope for much in these cases by using zinc sulphate, mustard, or similar substances, for even if they are gotten into the stomach, the probability is that the mucous coat is so far benumbed or destroyed that it will not respond; while on the other hand, if a centric emetic, such as apomorphine, is injected hypodermically, it will be rapidly absorbed, and the chances of its causing vomiting are infinitely greater than those with the former class.

The administration of the alkalies, especially lime in the form of a saccharate, seems to be founded upon good grounds, for according to Husemann (*loc. cit.*) they possess some antidotal properties. He also found that the oil is probably of no value; yet Lemaire declares when the acid was given with it that its poisonous effects were materially modified. As it is not at all probable that there is any chemical combination whatsoever between the acid and oil, it is likely that the latter merely acts mechanically by preventing a rapid absorption of the acid. On these grounds the oil may be administered quite freely with benefit.

Up to the time of the researches of Baumann and Herte (*Zeitschrift Phys. Chem.* I.) nothing was discovered of any special value as a chemical antidote for carbolic acid, but if the researches of these gentlemen prove to be of the value they seem invested, we have invaluable antidotes in the soluble alkaline sulphates. Baumann believes that when a soluble sulphate is given a *sulpho-carbolate* is formed that is innocuous. My friend, Cerna, found in ten experiments on animals (*Philadelphia Med. Times*, 1879, i. p. 592–597) decided evidences of the efficacy of these salts in this form of poisoning. He first decided the minimum fatal dose in rabbits and dogs, and after determining this point, gave what was deemed a toxic amount of the acid in conjunction with the sodium or magnesium sulphate, and in every instance where they were thus given together the animals recovered; yet, in repeating the experiments in the same animals, after due time had elapsed for recovery, with the same amount of acid, but without the soluble sulphate, fatal results followed; thus clearly proving the antidotal properties. It was then sought to determine if a sulpho-carbolate were formed in the economy, as believed by Baumann; consequently, the acid and solutions of the sulphates were mixed together in different proportions and different strengths, but he could obtain no chemical combination, and therefore doubted if such really takes place in the economy. Yet, until we have more conclusive proof than this, the question must still remain *sub judice;* the fact, moreover, of the disappearance of the sulphates from the urine very strongly intimates that the sulphuric acid is gotten rid of in this way.

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ARTICLE X.

THE USE OF HOT WATER IN THE LOCAL TREATMENT OF DISEASES OF THE EYE. By LEARTUS CONNOR, A.M., M.D., of Detroit, Michigan.

IN concluding an article on catarrhal conjunctivitis, in the St. Louis *Courier of Medicine*, June, 1881, Dr. C. E. Michel makes the following remark: "If we ever discover a remedy, which, when externally applied, is perfectly free from irritating properties, while it induces contraction of the walls of the smaller vessels and capillaries of a part, we will then be in possession of an agent which will find its application as a collyrium."

All known astringents he regards as acting as irritants, producing their effects on the muscular fibres of the bloodvessels through their peculiar irritating properties. Hence he regards them as both unsafe and unfit to act as local antiphlogistic remedies. Three years ago we were in the same state of despair, as regards such a remedy to produce local contraction of the smaller bloodvessels of the eyelids. We had faithfully used all the remedies we had seen applied in the best eye-clinics or had read of in books special or otherwise. But the results as observed in the hands of brother practitioners or our own were unsatisfactory.

At that time our attention was specially attracted to the results obtained by the local use of hot water in general surgery and especially in the treatment of various uterine affections. After pondering the matter over our conclusion was thus: If in diseases of the mucous membrane of the female generative organs hot water applied locally does so much good as Emmett and his school declare, why shall it not equally benefit diseases of the mucous membrane of the eyelid? We at once tried its use in diseases of the eyelid with most gratifying results. Then we applied it to the treatment of various diseases of deeper structures, with on the whole very satisfactory effects. For three years our experience in the use of hot water locally applied to the eye in inflammatory affections of its various structures, has constantly, with increasing force, demonstrated to us that as an agent to contract overdistended minute bloodvessels, and to give them tone without producing any ill effect, hot water is the remedy in all cases in which it can be tolerated or employed.

At first we were very cautious in its use, but increasing observation gave us increased confidence. At present we rely upon its uniform action more completely than upon any other one therapeutic agent that we employ.

The gynæcologist tells us that he observes a diminution of the passive congestion, and an increased tone to the mucous membrane and contiguous parts. He claims to be able to effect these results not only in the mucous membrane of the vagina and uterine mucous membrane, but also in all the tissues of the pelvis.

Dr. Emmett tells us that for many years he has been accustomed to employ hot water injections in almost every uterine case coming under his observation either in hospital or private practice. So thoroughly does he believe in the power of hot water to relieve the so-called inflammations of the female pelvic organs, that for over twenty years he has not either employed leeches or scarified the cervix. He does not regard the remedy as a cure-all, but one of the most valuable adjuvants under all circumstances to other means. The general surgeon extols the value of hot water in promoting repair after wounds of any description.

The use of irritants to the conjunctiva for the attempted relief of so many conjunctival affections is based on the theory that by their use an increased amount of blood was induced to flow through the affected part, carrying off the metamorphosis of diseased tissues and promoting the growth of healthy tissues. What, however, shall be said of the effects of these irritants on protoplasmic elements other than those connected with the vascular system. All recognize the fact that these effects are undesirable if not positively harmful.

By the use of hot water we seem to get the contraction of the bloodvessels without other disturbing effects. Any one who has watched the changes in the appearances of a hand long held in very hot water, as in the case of the washerwoman, will remember that speedily the skin becomes white and shrunken. This pale and shrunken condition lasts for a considerable time. In the case of the conjunctiva we have noticed the same effects hundreds of times, and we confidently expect them in every case, unless for some reason it is impossible for the vessels to respond to any stimulus. As a rule, we expect at the second visit to find the conjunctiva much paler and the swelling diminished. Besides, in almost all cases there is a feeling of comfort that discourages the patient to continue the use of the hot water.

In so far as we have been able to determine, it also retards when it does not absolutely stop the escape of the white blood corpuscles from the vessels and thus prevents the formation of pus. It also tends to check the growth of low weak forms of cells and to promote those of a normal kind. In short, its action is both upon the bloodvessels through their nerves and muscles and upon the cell elements in the lymphatics and mucous membrane, etc. etc. While hot water is not a "cure-all," there are few diseases of the eye in which its use does not increase the effects of the other remedies, and in not a few cases it is all the medication that is required. In this respect it follows the same general laws that govern its application in gynæcology and general surgery. It should never be forgotten that in the eye we have the same anatomical structures as elsewhere in the body, and that they are governed by the same general laws in physiology, pathology, and therapeutics. The only essential difference consists in the minuteness of structures and complexity of organization, with the corres-

ponding difficulties in making diagnosis and delicacy in applying treatment.

There are few diseases of the eye in which it is not desirable to allay congestion in some part of the organ. And we know of no other local remedy that will accomplish this so safely, so surely, and so speedily as hot water.

How shall hot water be employed?

On the answer to this question hangs the probability of obtaining the results alluded to.

1. The water must be as hot as the patient can comfortably bear with his hand. This temperature will vary with different persons and in different eye-diseases. It is a curious fact that the eye will habitually bear with comfort water at a temperature that is very uncomfortable to the nose, face, and hand applying it. To allay their fears as to the use of very hot water, I usually tell my patients at the first that the nose will be scalded before any harm is done to the eye.

2. The water should be placed in a large vessel, before the patient, on a chair or other support of a height that will readily permit the patient to bend the body upon the hips and the head upon the neck to such an extent as to permit the easy douching the eye by water thrown against it with the whole hand. Neither the hand nor the fingers, nor cloths, nor sponges, should touch the eye. Nothing should touch it but the mass of water thrown by the hand with force sufficient to come into firm contact with the eye.

3. The amount of water in the vessel should be sufficient to maintain the temperature tolerably uniform during the entire douching. I usually direct two quarts.

4. The length of time that the douching is to be continued varies with the tissues to be affected and the degree of the inflammation or irritation. If it be merely a superficial irritation due to some superficial irritant, a couple of minutes three times a day may suffice. In deeper seated inflammations, or in more chronic ones, it may be necessary to apply it for five minutes every hour or half hour. The guide for directions in this respect lies in the effects produced in the vascularity of the tissues. If this can be sufficiently reduced by using hot water for two minutes every four hours, it is both useless and annoying to use it oftener. But if the use of it five minutes every half hour is required in order to produce the same effect, then the less frequent and less prolonged use of the water is equally unsatisfactory. In short, it needs to be used as "opium to quiet pain" in doses sufficient to accomplish the purpose for which it is employed.

To one who has not observed the effects of hot water employed in the manner suggested, there will no doubt be a degree of scepticism concerning the results alluded to. But this will disappear as soon as the remedy is intelligently tried according to directions. Of course it must not be

expected that this remedy alone will cure all eye troubles. We have distinctly stated that only certain definite changes will be produced by it, all other changes require other remedies. While the remedy is a simple one and readily available almost everywhere, I know of none that requires more good sense and more care in its use than the one under consideration. Unless it be thus employed its use will be unsatisfactory. But under no circumstances have I observed any ill results to follow even the most careless or inefficient use of the remedy. But such use has failed to bring about the sought-for results.

As illustrations of some of the classes of cases in which I have found its use of value I give the following condensed reports from my case-book :—

CASE I.—Mr. W., aged thirty-five, a bookkeeper, of nervo-sanguine temperament, married, of good social position, and all the surroundings of a healthy life among the middle classes, came to my notice January, 1879. He complained of pain in and about his eyes, of inability to use them for any great length of time without blurring of vision and a slight discharge of matter in the inner corner of each eye in the morning. A pressure over the sclero-corneal junction produced considerable discomfort. There was injection of the conjunctiva throughout both its ocular and palpebral portions. The iris was contracted and sluggish. An examination with the ophthalmoscope showed a reddened optic papilla, enlarged retinal veins, and a state of congestion throughout the entire fundus. The tension of the eyeball was greater than normal. His general condition was very good. The eyes showed a moderate degree of hypermetropia. Believing that all the symptoms took their origin in the defect of refraction and the attempt to do more work than such eyes would bear, I corrected the defect by giving him a prescription for plus 1–46 and advised him to rest for a few days or longer if possible. Rest he informed me was out of his power without great losses which he could not afford. Besides the prescription for his glasses I ordered a laxative and a nerve tonic. With these he improved somewhat but in the main the symptoms still continued to trouble him. After a couple of weeks he ceased to improve at all. Being still annoyed by the same symptoms in a less degree, I bethought myself of the action of hot water. Hence I advised him take water as hot as his hand would bear and while at his home bathe the eyes, in the manner already described, for a period of five minutes every half hour. The last douching was directed to be taken at least half an hour before leaving the house. At his next visit, he stated that his eyes felt almost well. The hot water had removed the soreness, most of the redness of the conjunctiva, relieved the sensitiveness of the eyeball to pressure. The intra-ocular congestion had also mostly disappeared. Within a period of three days all unpleasant symptoms were gone, not to return to date of writing.

This case illustrates the value of hot water in that large class of cases in which a condition of chronic hyperæmia has been induced in the eye by some defect of refraction, combined or not with a lowered state of the general bodily vigor, or an asthenopic state from any cause which can be or has been removed. The passive congestion remaining after the removal of the cause is in this way pleasantly cured. Indeed I have learned not to wait for the removal of the cause, but to begin at once the use of

the hot water, finding that in this manner the period of treatment is materially shortened, a better result usually attained and the patient rendered far more comfortable.

In all forms of blepharitis the effects of hot water are very striking, especially in its acute forms.

CASE II.—Miss G., aged twenty-five, a kitchen girl, white, of excellent health, consulted me June 1, 1880, for the relief of an acute attack of blepharitis ciliaris. She said that she was frequently subject to these attacks, and that they were a source of great annoyance to her. I found that from time to time she had been under the care of several able oculists. In seeking for the cause of these recurrent attacks I found a condition of astigmatism. This I at once corrected by the appropriate cylindrical lenses. The bowels were regulated and the yellow oxide of hydrargyrum ointment, grs. x to the oz., applied daily to the very roots of the eyelashes, the scales being first removed. Hot water was ordered at intervals of three hours and to be applied for a period of five minutes each time. The relief was most rapid, as the pain, heat, and swelling had mostly disappeared by the second day. The use of the mercury ointment was then stopped and simple cosmoline applied by the patient every night after using the hot water. In two weeks all treatment ceased and the patient had no further trouble with her eyes.

In all cases of blepharitis ciliaris with or without complications, I order the hot water in addition to the remedies usually employed, and the corrections of any defects in the eye or elsewhere that may aid in keeping up the morbid state of the circulation at the edge of the eyelids. At my public clinic it was the occasion of remark among the patients, the students, and such members of the profession as honoured me by their presence, to notice the rapidity with which these cases recovered.

There are a large class of cases of simple conjunctivitis, due to a variety of causes. In all of these I have found no one remedy of so much service as the one under consideration. Of course it does not interfere with other remedies that may be employed. To illustrate:—

CASE III.—Mr. R., aged twenty-two, in general health perfect, but after exposure to the hot rays of the sun reflected from the water during a ride on the river, was taken with pain in the eyelid, smarting of the conjunctiva, overflow of tears, mucus discharge, gradually increasing in thickness until it became muco-purulent, etc. etc. When I examined him two days later, the entire conjunctiva was very red and much of it greatly thickened. The papillæ were greatly enlarged. I at once ordered hot water every hour for a period of five minutes. After each douching of the eyes I ordered to be dropped into the eyes five drops of a saturated solution of boracic acid. Night and morning I applied to the inverted lid an ointment of yellow oxide of hydrargyrum, one grain to the ounce of cosmoline, to the extent of a piece as large as a grain of wheat. A vigorous cathartic was administered and one grain of quinia sulphate every two hours. Immediate relief followed the beginning of the treatment, both as regards the unpleasant symptoms of the patient and the objective appearances of the conjunctiva, and in a few days complete recovery followed.

In granular inflammations of the conjunctiva, acute or chronic, the hot water is invariably a valuable assistance to the other remedies employed. The relief of the congestion of the bloodvessels and the consequent increase of the amount of good blood constantly supplied to the diseased tissues greatly promotes the disappearance of the neoplastic growths. This combined with the yellow oxide of hydrargyrum ointment, in strength varying from one to twenty grains per ounce of cosmoline and a saturated solution of boracic acid, constitute the best combination of local remedies that we have found in the treatment of this obstinate disease. The yellow oxide seems to us to destroy these neoplastic growths called granulations and so to encourage the normal processes of repair. By its action already alluded to, the hot water greatly increases its power. In short it accomplishes objects unattainable by the yellow oxide alone with the same degree of rapidity. At another time we shall give illustrative cases in proof of the foregoing. We regard the hot water as a very important addition to our therapeutics of these diseases.

In all corneal affections I have found the douching by hot water to be followed by relief of pain, the restraint or total arrest of the destructive processes and the promotion of reparative ones. These statements are most readily verified by any one who will only look after the use of the remedy. From the well-known fact that the cornea is supplied with blood at a disadvantage, and that in cases of its disease, danger arises from defective blood supply, it is clear that any remedy that will obviate this danger, will meet a most important indication. Such a remedy is hot water. Hence both theory and actual observation combine to advise the local use of hot water in corneal diseases.

In iritis I have found hot water douching to accelerate the action of the usual remedies and to greatly promote the comfort of the patient. The same remark applies to the deeper inflammations of the eyeball.

After all operations upon the eyeball or its appendages, in which the nature of the wounds or the condition of the patient permit its employment, I never omit the local application of the hot water as the most valuable of all agents for the prevention or relief of inflammation and the promotion of the patient's comfort.

In conclusion we may say—

1. Hot water locally applied has the same power over inflammatory processes in and about the eye as in and about the uterus or any other portion of the body.

2. It has been shown by the late Dr. Pitcher, of Detroit, and by others since his time, that hot water has the power to contract bloodvessels so as to stop hemorrhage and to bring about a more normal state of the local circulation.

3. It is clear that hot water materially limits acute and chronic inflammatory processes, stopping or preventing septic poisoning and suppuration

by its power to destroy or to hold in check the superabundance of white and red blood corpuscles and other protoplasmic elements so numerous at every spot of inflammation or other disturbance of local malnutrition.

4. To accomplish these ends hot water is an invaluable adjuvant to our means for treating all sorts of inflammations of the eye or its appendages.

5. It needs to be applied systematically, as frequently and as hot as is needful to attain the end sought in any particular instance. Further, it must be applied in such a manner as shall not do more harm than good. Thus the use of cloths, sponges, or any similar substance that is brought in direct contact with the eye is likely to set up so much irritation as to largely diminish if not absolutely destroy the good effects of the hot water. The best method that we have found for applying hot water to the eye is to throw it by the handful against the eyeball, taking it from a vessel so situated as to render the act easy and comfortable. At no time should anything but hot water come in contact with the eye. The directions given in the body of this paper more specifically, are such as we have found absolutely essential to obtain any good result, or at least, the very best results.

6. The difficulties in carrying out this treatment are the amount of time and care called for by it. The surgeon who prescribes it must carefully watch that it is carried out exactly as ordered if he expects the indicated results. In most cases he will be materially assisted by the sense of relief from pain and discomfort so generally felt by such as faithfully follow directions.

7. As regards catching cold I generally order that the last douching be taken a half hour before leaving the house by all patients not confined to the house.

8. Used in the manner indicated, to accomplish the ends specified, hot water is an invaluable remedy in the treatment of diseases of the eye. It will accomplish certain indications of treatment more certainly, more safely, more quickly, and more pleasantly than any other single remedy with which we are acquainted.

103 CASS ST., DETROIT.

ARTICLE XI.

A CONSIDERATION OF SOME OF THE MEDICAL AND MEDICO-LEGAL RELATIONS OF SUICIDE, ESPECIALLY IN REGARD TO ITS OCCURRENCE IN THE UNITED STATES.

By ROYAL WHITMAN, Interne at McLean Asylum, Somerville, Mass.

THE word suicide in the sense most usually adopted, simply designates the act by which a person kills himself, whatever be the determining

cause, or the means employed to accomplish it. In early times insanity does not appear to have been taken into consideration as a cause of suicide, and hence the various severe laws punishing it as a crime.

The Hebrews treated the bodies of suicides as those of criminals executed by the orders of the judges, in giving them no burial until after sunset.

The Armenian laws ordained that the house in which the suicide had lived should be cursed and burned.

At Thebes, the bodies of suicides were burned, and no mourning or religious ceremonies were allowed at the burial of the body.

The laws of Athens ordained that the hand which had committed the crime should be cut off and burned.

The ancient Roman laws deprived the bodies of suicides of sepulchre. The later Roman laws, favourable to suicide when caused by distaste of life, or by any great sorrow, annulled the wills, and confiscated the goods of criminals who had committed suicide to escape punishment. They also disgraced the memory of soldiers who had committed or had attempted to commit suicide.

The Roman Catholic Church Council which met in the year 452 condemned suicide as a crime, forbidding the honours of sepulchre to those who had killed themselves, unless they repented before death, or were insane.

After the introduction of Christianity, all European countries proscribed suicide under severe penalties.

In England the bodies were thrown into ditches and their goods were confiscated to the profit of the Crown. In the present century the law has been as follows: "By the common law of England a *felo de se* forfeited all chattels, real or personal, which he had in his own right, and his will became void as to personal property. (Blackstone.) To avoid this law, coroners' juries have almost universally returned a verdict of insanity. (Ray, *Medical Jurisprudence of Insanity*, 1871.) The question has been recently decided in England in regard to persons *felo de se;* that freeholds of inheritance of which such persons are seized at the time of their death, do not escheat to the Crown, but pass to the heir-at-law." (Redfield, *Law of Wills*, Boston, 1865.) In France in the twelfth century the goods of the suicide belonged to the lord on whose land the deed had been committed, and the body, having been dragged through the streets on a hurdle, was hung up by the heels and deprived of sepulchre.

This law was modified until in 1551 it was similar to the canonical law. In this form it remained in force until the last century, when Voltaire, Beccaria, and Montesquieu protested against it, accusing it of injustice and barbarism, and the revolution finally abolished it.

Opinions on the subject gradually changed until, in the present century, suicide came to be regarded as a proof of insanity. In support of this

theory pathological investigations were made with a great variety of results. Récamier found thickening of the membranes of the brain; Gall found an increase in thickness of the bones of the skull; Cabanis found an increase in the amount of phosphorus in the brain; while others attributed suicide to various affections of the abdominal organs.

Esquirol, and many other writers of his time, regarded all suicides as insane. "I believe that I have now proved that an individual will only put an end to his life when he is delirious, and that all suicides are mentally diseased." (Esquirol, *Des Mal. mentales*, Paris, 1820.)

"Suicide is an act of delirium." (Dr. Falret, *De l'Hypochondrie et du Suicide*, Paris, 1827.)

Esquirol makes suicide a distinct variety of insanity under the name of *monomanie ou mélancholie* suicide.

Dr. Forbes Winslow, who is almost the only English writer on the subject, regards all suicides as insane, and quotes from Dr. Rowly as follows: "As no rational being will voluntarily give himself pain, or deprive himself of life, which certainly while human beings preserve their senses must be acknowledged evils, it follows that every one who commits suicide is indubitably *non compos mentis*, and is not able to reason justly, but is under the influence of false images of the mind, and therefore suicide should ever be considered as an act of insanity." Winslow finds some difficulty, however, in proving many of the suicides of antiquity insane, as Cato, Brutus, Socrates, Seneca, and others, and concludes that "no inference can logically be applied to the suicides of modern times, as we live under a different dispensation." But he makes his definition of insanity a very broad one, quoting Ellis, who says that lowness of spirits ought to be regarded and treated as insanity.

In speaking of the unjustifiableness of a verdict of *felo de se*, Winslow gives the following rules for coroners who have any doubt as to the insanity of the suicide. "Particular inquiries should be made into the following points:—

"1st. As to the state of mind for some time prior to the act.

"2d. As to the presence of any disease of the stomach or liver which may have operated injuriously on the mind.

"3d. In many cases it will be found that the suicide had received a blow on the head at some period of his life, giving rise to cerebral injury which may have remained latent for a great length of time and then suddenly manifested itself.

"4th. Is insanity, particularly suicidal insanity, in the family? Had his mind been dwelling on the subject of suicide? Was he monomaniacal or remarkable for any peculiar eccentricity? These and many other questions should be carefully sifted if there is any doubt as to the presence of mental disease in such cases."

It is evident that if these rules were followed all suicides would be re-

garded as insane. As for instance: Several Italians of the crew of a vessel which was wrecked near New York last winter, cut their throats to avoid death by drowning, and it is said that certain classes of Italian sailors always carry knives for this purpose, believing that drowning is one of the most painful of all deaths. Such suicides would hardly appear to be the result of insanity, but by these rules they would be classed as such.

"Reasoning by simple induction, I say that suicide is always a disease, and always an act of insanity. I say, therefore, that it merits neither praise nor blame." (Dr. Boudin, *Du Suicide considerè comme Maladie*, Paris, 1845.)

Other authors discriminate between the numerous suicides undoubtedly caused by mental disease, and other cases where there is not the slighest evidence of insanity.

Drs. Lisle and Bertrand show that many of the arguments which are brought forward to show that suicide is always the result of insanity would apply equally well to homicide or even to other crimes. They speak of the number of suicides which appear to be the result of reason and discrimination, as to escape punishment or disgrace. (Bertrand, *Traité du Suicide*, Paris, 1857; E. Lisle, *Du Suicide*, Paris, 1856.) Griesinger says: "Whatever certain scientific authorities may assert, we are not warranted in coming to the conclusion that suicide is always a symptom or result of insanity. There is no insanity present when the feeling of disgust with life is in exact relation to the actual circumstances; where evident moral causes exist which sufficiently account for the act; where the resolution has been deliberately made and might have been abandoned had the circumstances changed, and in which we discover no other symptom of mental derangement, as when a man prefers death to a miserable, contemptible life. The abhorrence of life, and the idea of self-annihilation correspond to the intensity of the painful impressions which bear upon the individual." (Dr. Griesinger, Berlin, 1845.)

He concludes, however, that such cases are extremely rare, and that the great majority of suicides are insane.

"In case of a will contested on the ground of insanity, the only difficulty consists in deciding if a suicidal monamania has or has not been present. This problem is much more difficult because the term suicidal monomania is subject in the general opinion to a very elastic interpretation. Since some consider every individual who kills himself as insane, while others, perhaps with more reason, admit mental alienation as a cause of suicide but in certain cases. Without inquiring abstractly into that which passes in the mind of a suicide in the few moments which immediately precede the act of killing himself, we should consider the motives which have determined the act. These are often so frivolous, so chimerical, that we cannot establish a reasonable relation between their lightness, their

propriety, and the enormous gravity of the act which they determine. For instance, when suicide becomes the means of escaping the scaffold, from infamy, from misery, or even when it is the result of one of these extreme passions, such as love or jealousy, I can conceive that independently of a judgment from a moral or religious point of view, I can conceive, say I, that it can be considered as an act that no insanity has preceded. But when, on the contrary, we see suicides terminate their lives from frivolous and insignificant causes, as where Vatel, the celebrated cook, killed himself because the fish did not arrive in season for a dinner given to Louis XIV., or in the case of a taster of wines, who killed himself because he had been deceived in the quality of a wine, or in the case of the young woman who stabbed herself, 'parce qu'un vent lui avait échappé,' before a numerous assembly: in cases of this class we must conclude that there existed an unhealthy tendency to suicide, involving a pre-existing disturbance of the judgment." (*De la folie, considérée dans ses rapports avec les questions medico judiciaires.* Dr. C. C. H. Marc, Paris, 1850.)

"That sane people commit suicide is a fact that must be apparent to every one who exercises common sense in looking at the subject. The hundreds of poor creatures who are rescued from the Thames, or brought to our general hospitals half poisoned or with throats half cut, are not insane in any medical sense of the term." (Dr. Blanford, London, 1877.)

"Suicide in a great number of cases is the result of mental disease; in other cases it can be considered from the causes which provoke it, and the circumstances which accompany it, as a weakness, a fault, or a crime." (Dr. Leuret, Paris, 1837.)

"If, in the number of suicides, an important part, perhaps one-third, be ascribed to mental disease, perhaps a more important part should be reserved for those individuals in whom one can but suspect a cerebral change escaping our means of investigation, a modification due to hereditary degeneration or to special degeneration of the faculties caused perhaps by excess, or social position. Then there will remain still a third class of individuals, with whom this act often caused by imitation, can no more be attributed to insanity than can any access of anger, and all the states of moral depression which follow the sudden loss of hope, of delusions, &c." (Dr. Le Roy, *Traité du Suicide*, Paris, 1870.)

"Men who see in the actions of men but the necessary results of the physical organization, consider that suicide is always the result of disease, because it is an act contrary to reason, but what crime is not in the same sense contrary to reason? Should we excuse them all as involuntary, as the result of a derangement of the organs of the mind? What will become of morality if it is decided that to kill one's self is always an irresponsible act, and never a crime? Nothing is good or bad, but are equally the result of insanity." (Dr. N. Ebrard, Paris, 1870.)

Du Saulle, in a medico-legal study on wills contested on the ground of insanity, says: "Suicide is not in itself a proof of insanity, and where there is no other reason for thinking a person insane, a will made at the last moment can be and in most cases is valid." (Dr. Legrand Du Saulle, Paris, 1879.)

"Suicide is not conclusive evidence of insanity in respect to a will executed immediately previous to the act." (Wharton, *Medical Jurisprudence*, Phila., 1875.)

"It seems to be abundantly settled by repeated decisions, both in this country and in England, that suicide is no certain evidence of insanity at the time of the act." (Redfield, *Law of Wills.*)

"Suicide is always an unnatural act, but in the large proportion of cases, if not the majority, is committed by sane people." (Dr. Gray, *American Journal of Insanity*, vol. xxxv. No. 5, New York, 1878.)

"That suicide can be committed in a perfectly healthy state of mind cannot, for a moment, be disputed. On the other hand, that the act is, in a large number of instances, the consequence of disease, is equally indisputable." (*Psychological Medicine*, Bucknill & Tuke, Phila. 1879.)

"It has been asked if an exclusive and overpowering passion cannot be considered as a monomania. No. The insane person obeys, as a machine, a motive force of which he cannot combat the power. The man who acts under the influence of passion has commenced by allowing his will to become weakened, and it is his will overborne by passion which throws him into crime. The first obeys an irresistible power. The other could have resisted, but has not wished to do so. In the most delirious paroxysm of passion, man does not cease to have a perception of the good and bad, and of knowing the nature of the acts which he commits. Violent passions brutalize the intelligence, but do not destroy it. They carry the will to extreme resolutions, but do not deceive it by hallucinations, or chimeras. There is not a temporary suspension of the intellectual faculties; man acts under the influence of a sentiment which overcomes him, but he has accepted this domination and acts voluntarily." (Devergie, *Médecine légale*, Paris, 1860.)

It seems evident to me, that suicides who are not insane in any practical sense of the term comprise a large proportion of all those who kill themselves. It seems reasonable to suppose that a materialist believing that death implies annihilation, or even a person with uncertain ideas as to the future state, can easily imagine certain situations where he would prefer death to a life which offers no attractions for him.

The influence of religious belief can be seen in the suicides of India; the religious devotees throwing themselves under the wheels of their idols, believing in their immediate transportation to a happier existence.

The suicides that we read of daily, of defaulters, of men after failures in business, or other projects (it is stated that the suicides at the gambling

resort, Monte Carlo, average three weekly), of disappointed lovers, and of sentimental young people for various causes, real or imaginary, show no evidence of insanity, but rather a moral, or possibly an intellectual weakness, depending in many instances on a faulty education, or on the influences by which the person is surrounded; and it seems very possible that if each person who thought of committing suicide believed that he was to be punished in a future existence for his acts in this world, the number of suicides would be greatly diminished—not only the voluntary, but those which are considered to be the result of insanity.

It is evidently almost impossible to classify suicides correctly—as caused by mental disease or not—and many cases which have been considered voluntary (I use this term to distinguish them from suicides which are the result of mental trouble, and are thus in one sense involuntary or automatic) would on closer examination be classified as involuntary. To illustrate this point: A physician engaged in a large and lucrative practice, and noted for his sagacity in business as well as professional affairs, for more than a year before an unsuccessful attempt at suicide, had a presentiment that he should cut his throat, and on this account did not dare to shave himself for fear that he could not resist the temptation to kill himself. If his attempt had been successful there would have been no evidence to show that he was insane, though immediately after his unsuccessful attempt he developed an attack of acute insanity, and has since been confined in an asylum.

There is generally a marked difference between the sane and insane, with regard to suicide.

If the first attempt of a sane person be unsuccessful, a second is rarely made, or, at least, not for some time; while the insane person, constantly urged-on by delusions, or imaginary voices, often makes the most desperate and continuous attempts to accomplish his purpose.

It has been stated that the mind of the insane person is generally fixed on some particular way of committing suicide, and that he will make use of no other means, even if he has the opportunity. This is often the case; but there are many exceptions. To illustrate: the three most recent cases of suicidal insanity, in an asylum, are as follows:—

CASE I.—This patient, though most carefully watched, night and day, by special attendants, who are locked into a room with him, has, in the space of twenty months, succeeded in making more than thirty-five attempts to commit suicide, by fourteen different methods, viz.: 1, cutting throat, with glass; 2, throwing himself from a height; 3, strangling, with chain of the bath-tub; 4, smothering with pillows, and by inserting his head into the bowl of the water-closet; 5, choking, with peach-stones; 6, hanging; 7, burning; 8, starving; 9, bursting bloodvessels, by holding his nose and straining; 10, eating injurious substances, brick-dust, etc.; 11, masturbation, to weaken himself; 12, retention of urine; 13, dashing his head against various articles; 14, inoculation with cancerous material. This latter method is, I think, an original one. The patient (having previously

scratched his finger), while walking in the garden, broke away from his attendant, and attempted to inoculate himself with the secretion of an epithelioma, from another patient.

CASE II.—This patient, though watched night and day, has made twenty-four attempts, in twenty months, by eleven different methods: 1, drowning, bath-tub; 2, hanging, with suspenders; 3, cutting throat, with broken glass; 4, dashing his head against the wall; 5, choking, with stones; 6, strangling; 7, smothering, with bedclothes; 8, starving; 9, opening bloodvessels, with broken glass; 10, poison; 11, squeezing his testicles.

CASE III.—Has made twelve attempts in about twenty months, by six different methods: 1, poison, verdigris, obtained by placing copper cents in lemon-juice; 2, drowning; 3, eating broken glass; 4, starving; 5, hanging; 6, running scarf-pins into his body in various places.

The question of the criminality of suicide has been discussed by the moralists and philosophers of all times; and they have always been divided on the subject. One part condemned it in an absolute manner; others condemned it in principle, reserving certain cases which they have decided to be justifiable under the circumstances; while a third part claimed it as a right of the human race. Establishing the principle that a wise man can and ought to leave life when it becomes distasteful to him, Pliny considered suicide to be the only consolation of man, and pitied the gods who were immortal. Zeno, Seneca, Stobæus, and Plutarch approved of suicide. Plato, Pythagoras, and Aristotle condemned it. Socrates condemned suicide as the act of a coward deserting his post.

Epictetus condemned equally the immoderate fear or desire of death. He says: "What folly to desire death because you are dissatisfied with life, when it is your manner of living which causes you to desire death! And how ridiculous to invite death when it is the fear of death which has troubled our life!"

Other authors are uncertain as to the morality of suicide, as Marcus Aurelius, Rousseau, and Chateaubriand; while Montaigne and Montesquieu approve of it. "When I am crushed down with grief, with misery, with disdain, why should one wish to prevent me from putting an end to my troubles, to cruelly deprive me of a remedy which is in my own hands? Why should one wish that I should still labour for a society which I despise, that I should still hold to a contract which was made without my consent?" (Montesquieu, *Lettres Persanes.*)

While doctrines of Buddha and Brahma favour suicide, the Koran forbids it: "Do not kill yourself, for God is merciful; whoever shall act thus by iniquity or perverseness shall be consumed by fire." (Sura iv.)

The commandment, "Thou shalt not kill," is generally considered as including suicide, though some authors deny this, and others even go so far as to accuse Jesus of suicide since he might have saved himself if he had so desired.

"Has man the right to kill himself when he thinks that the sum of

his misfortunes has passed beyond that experienced by those about him? A negative response cannot be doubted. 1. It is offensive to our moral sense, to allow to man the right to break the tie which binds him to earth, when he is absolutely ignorant of the purpose for which he has been placed here, and if we examine the question from a less elevated point of view, we must recognize the fact that the suicide involves his family, into the midst of which he brings shame and sorrow, which reacts on each member. 2. He commits a crime against his fellow citizens, and by the same act social disorder, since after having done in this world what has pleased him, man believing that death annuls all engagements would place himself above the justice and morality of all nations." (Le Roy, Paris, 1870.)

There have always been suicides, and examples more or less numerous are to be found in the histories of every country. In Europe suicides were almost unknown during the middle ages, and few examples can be found until after the fifteenth century. Since this time, however, there seems to have been a steady increase.

Complete records of the number and causes of suicide have not been kept until quite recently. These are most complete in France, where they have been kept with great exactness since 1835. Dr. Lisle made a careful study of these records, and his conclusions stated briefly are as follows: That the number of suicides increases every year in France, and in all other countries, out of proportion to the increase of the population. That climates have no influence on suicide. That the greatest number of suicides occur in the spring and summer. That the tendency to suicide increases from infancy to old age. That it is much more frequent among men than among women; 3–4 to 1 of the latter.

Dwelling in cities favours the tendency to suicide. Dr. Lisle then says: "It is not true that education ought to be considered as a preservative against suicide. On the contrary, suicide has increased in direct proportion to the amount of instruction that has been afforded the population, not only in France but in all other countries where inquiries have been made." To support this statement he gave the following table, 1827–34:—

	No. of Scholars to each Inhabitant.	No. of Suicides to each Inhabitant.	Average No. of Scholars.	Average No. of Suicides.
Boston . . .	1 to 3 5	1 to 12.500		
New York City	1 " 3.9	1 " 7.797		
Prussia . . .	1 " 7.0	1 " 14.400	1 to 5.6	1 to 12,644
Philadelphia .	1 " 8.0	1 " 15.875		
Austria . . .	1 " 13.	1 " 20.900		
France . . .	1 " 17.	1 " 20.740	1 to 132	1 to 30,274
Russia . . .	1 " 36.7	1 " 49.182		

This is obviously unfair, as it compares a few cities of the United States with European countries. This statement that suicide has been more frequent in the United States than in foreign countries has been frequently quoted; but it is entirely incorrect. According to the United

States census the suicides in the year 1850 were 491, or one suicide to 47,233 inhabitants. In 1860 the total suicides were 993, or one suicide to 31,664 inhabitants. In 1870 the number was 1345 or one to 28,666 inhabitants. While the suicides of Europe taken as a whole average about one to 5000 inhabitants.

Of the cities mentioned in the above table for the years 1827–34, Philadelphia, for a corresponding number of years, has at present about the same proportion of suicides that it had then, *i. e.*, about one suicide to from 12,000 to 15,000 inhabitants; while Boston has had for the last seven years about one suicide to 10,000 inhabitants.

The following table shows the suicides in New York City from the year 1803:—

Average Number of Suicides in New York City.

5 years ending	1808 =	15	Average number of inhabitants to each suicide.		5,468
" "	1813 =	9½	"	"	10,140
" "	1818 =	13⅗	"	"	10,365
" "	1823 =	17½	"	"	6,327
" "	1828 =	23⅗	"	"	7,309
" "	1833 =	28½	"	"	7,438
" "	1838 =	36	"	"	7,463
" "	1843 =	31¼	"	"	10,529
" "	1848 =	26½	"	"	16,580
" "	1853 =	38½	"	"	14,695
" "	1858 =	66½	"	"	10,489
" "	1863 =	50½	"	"	16,076
" "	1868 =	63⅕	"	"	11,185
" "	1873 =	115⅘	"	"	8,241
" "	1878 =	155	"	"	6,764
For the year	1879 =	117	"	"	9,786
" "	1880 =	152	"	"	7,938

Suicides in some of the other principal Cities of the United States.

SAN FRANCISCO.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1870	44	1873	59	1876	75	1879	86
1871	45	1874	60	1877	103	1880	90
1872	37	1875	56	1878	90		

For 1880—one suicide to 2589 inhabitants.

ST. LOUIS.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1870	13	1873	22	1876	32	1879	51
1871	13	1874	34	1877	67	1880	57
1872	23	1875	7	1878	59		

For 1880—one suicide to 6325 inhabitants.

BOSTON.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1874	25	1877	39	1879	36
1875	45	1878	34	1880	40
1876	37				

For 1880—one suicide to 9063 inhabitants.

BALTIMORE.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1875	25	1877	16	1879	6
1876	14	1878	16	1880	6

For 1880—one suicide to 55,365 inhabitants.

CHICAGO.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1870	44	1873	55	1876	41	1879	49
1871	28	1874	53	1877	55	1880	63
1872	39	1875	45	1878	52		

For 1880—one suicide to 7743 inhabitants.

BROOKLYN.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1870	28	1873	31	1876	51	1879	37
1871	28	1874	34	1877	50	1880	31
1872	31	1875	39	1878	52		

For 1880—one suicide to 18,280 inhabitants.

PHILADELPHIA.

Year.	Suicides.	Year.	Suicides.	Year.	Suicides.
1870	25	1873	47	1875	68
1871	41	1874	52	1876	60
1872	48				

For 1876—one suicide to 13,759 inhabitants.

Of the 117 suicides in New York City in 1879, but 29 were natives of the United States.

San Francisco is an anomaly among the cities of the United States. The suicides for the year 1880 were 90 (of whom but 32 were natives of the United States), or one to every 2589 of the inhabitants. The suicides in New York City for the same year were 152, or one to 7938 of the inhabitants. The suicides in Paris, which has always been supposed to be the leading city in that respect, for the year 1878 were one suicide to every 2676 of the inhabitants. Thus San Francisco has $2\frac{1}{2}$ times as many suicides as New York, and also excels Paris in this respect. There were also in San Francisco, in 1880, 54 attempts at suicide, which would give a total of 144 successful and unsuccessful attempts at suicide, or one to 1618 of the inhabitants.

Of the total 1345 suicides in the United States in the year 1870, 832 were natives of the United States, while 492 were born in foreign countries. The total native population in 1870 was 33,082,953. The total foreign born population was 5,473,030. Among the natives of the United States there was but one suicide to 39,763 inhabitants; while there was one to 11,124 of the foreign born inhabitants.

Statistics show that though education is much more advanced in the United States than in Europe, yet suicides are much less frequent here than there, and that among the inhabitants of the United States the contrast between the native and foreign born is very striking, not only in

the entire country but in each State also, though the native born are much better educated than the foreign. The United States, therefore, seem to be an exception to the rule which has been so universally quoted, that education increases the tendency to suicide. It seems reasonable enough to admit that a savage whose aspirations are so limited, and whose disappointments are proportionately small, would have little temptation to kill himself. Again, it seems reasonable to suppose that a certain amount of instruction, sufficient, perhaps, to enable a person to read and appreciate the sensational stories of the present day, where suicide generally forms an important part of the plot, in which the suicide of the disappointed lover is extolled as an act of courage, would favour the tendency to suicide; and statistics show that this class furnishes the greatest proportion of suicides; but beyond this point I do not admit the correctness of the rule. I am convinced, on the contrary, that a good education, combined with a common-sense moral and physical training, is the best safeguard against suicide or insanity.

In an article in the *American Journal of Insanity*, vol. xxxiv. No. 4 (Suicide not an Evidence of Insanity, by Hon. O. H. Palmer, of New York), occurs the following: "It was my purpose in the outset to present the statistics of this increasing and appalling crime in our own country; but to my great disappointment I find it impossible. I have looked into the United States census reports, and could give you from them the number of insane and idiotic, the number of deaths by consumption and many other diseases, but not one word as to deaths by suicide. This subject, which I think is one of the greatest importance in vital statistics, seems to have been wholly ignored," etc.

As a contribution towards the literature of this subject, and for the purpose of partially filling this void, I have collected the following otherwise uninteresting tables, chiefly from the census of 1870:—

Suicides.

	Natives of the United States.	Natives of Foreign Countries.	Native inhabitants to each native suicide in each State.	Foreign inhabitants in each State to foreign suicide in each State.
Alabama	8	0	123,378	—
Arkansas	4	0	119,831	—
California	30	52	11,680	4,035
Connecticut	18	3	23,545	37,879
Delaware	2	1	56,939	—
Florida	6	1	30,463	4,967
Georgia	14	0	83,784	—
Illinois	46	58	45,754	8,882
Indiana	37	6	41,599	23,579
Iowa	18	18	54,838	11,371
Kansas	10	5	31,600	9,678
Kentucky	16	7	78,600	9,057
Louisiana	7	8	95,055	7,728
Maine	27	2	21,409	24,440
Maryland	10	3	69,748	27,470
Missouri	36	18	41,639	12,348

	Natives of the United States.	Natives of Foreign Countries.	Native inhabitants to each native suicide in each State.	Foreign inhabitants in each State to foreign suicide in each State.
Massachusetts	82	23	13,463	15,361
Michigan	21	11	43,621	24,364
Minnesota	4	3	62,277	53,365
Mississippi	9	3	90,746	3,730
Nebraska	5	2	18,449	15,374
Nevada	2	3	11,845	6,267
New Hampshire	24	1	12,028	29,611
New Jersey	11	9	65,195	20,993
New York	120	109	27,036	10,443
North Carolina	10	0	106,803	—
Ohio	59	37	38,860	10,067
Oregon	2	2	44,661	5,800
Pennsylvania	73	45	40,773	12,117
Rhode Island	5	1	32,391	—
South Carolina	5	0	139,506	—
Tennessee	15	3	15,947	6,438
Texas	15	13	50,411	4,800
Vermont	23	2	12,321	23,517
Virginia	14	2	87,529	6,877
West Virginia	10	1	42,492	17,091
Wisconsin	25	30	27,606	12,149
Territories	9	9	49,192	10,466

It will be seen that in nearly all the States the proportion of suicides to the inhabitants is much larger among the foreign than among the native population.

Suicides in the United States at each Age. Male and Female.

Ages.	Males.	Females.	Total.	No. of inhabitants at each age to each suicide at corresponding age.	Deaths from all causes to deaths from suicide, at each age.
5 to 10	2	0	2	2,407,356	13,164
10 to 15	9	3	12	398,849	1,331
15 to 20	34	32	66	61,221	307
20 to 25	98	38	136	27,561	191
25 to 30	102	33	135	24,112	167
30 to 35	95	42	137	18,707	142
35 to 40	88	30	118	19,618	170
40 to 45	116	16	132	14,697	136
45 to 50	123	27	150	10,533	107
50 to 55	113	21	134	10,208	120
55 to 60	65	16	81	10,819	163
60 to 65	73	10	83	9,384	191
65 to 70	61	8	69	7,019	209
70 to 75	33	3	36	9,565	406
75 to 80	25	2	27	6,507	429
80 to 85	10	0	10	9,460	959
85 to 90	5	0	5	6,895	905
Unknown	8	4	12		
	1060	285	1345		

From this table it will be seen that though the most suicides occur at the ages 45 to 50, yet taking the population at each age into consideration, the tendency to suicide is greatest at the ages 75 to 80. Within a few days two suicides at the age of 100 have occurred, which would make the greatest tendency at this age in 1881.

Suicide by each Method in each Month of the Year.

	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December..	Total.
MALES.														
Gunshot	...	19	22	20	27	38	15	15	9	19	13	22	18	237
Cutting throat	...	11	8	4	10	12	13	8	10	7	9	12	5	109
Drowning	...	3	10	5	8	12	9	9	6	5	2	2	5	76
Hanging	...	19	24	17	39	54	24	27	26	25	8	24	17	104
Poison	...	14	12	14	13	13	9	12	12	10	8	4	7	128
Not specified	1	17	7	13	23	23	14	20	14	9	16	27	22	206
Total—males	1	83	83	73	120	152	84	91	77	75	56	91	74	1060
FEMALES.														
Gunshot	...	1	4	2	3	...	1	1	1	...	...	1	...	14
Cutting throat	...	5	3	2	6	2	...	3	1	...	1	1	...	24
Drowning	1	3	1	3	4	9	4	2	4	...	5	3	4	43
Hanging	...	4	3	6	7	13	7	4	3	6	4	3	6	66
Poison	...	6	7	2	6	15	6	3	9	6	5	6	4	75
Not specified	...	10	4	7	5	7	8	6	3	2	4	2	5	63
Total—females	1	29	22	22	31	46	26	19	21	14	19	16	19	285
Grand total—males and females	2	112	105	95	151	198	110	110	98	89	75	107	93	1345

It will be seen that May is the favourite month for suicide both for males and females in the United States, the number being greatly in excess of any other month.

Methods adopted as regards Nationality.

	Unknown.	Natives of the United States.	Natives of foreign countries.	Total.
Gunshot	3	157	91	251
Cutting throat	1	84	48	133
Drowning	3	61	55	119
Hanging	3	267	100	370
Poison	4	123	76	203
Not specified	7	140	122	269
	21	832	492	1345

	Natives of Germany.	Natives of Ireland.	Of all other foreign countries.	Total foreign born suicides.
Gunshot	55	11	25	91
Cutting throat	22	11	15	48
Drowning	28	14	13	55
Hanging	47	23	30	100
Poison	29	14	33	76
Not specified	65	31	26	122
	246	104	142	492

It will be seen that the suicides of the natives of Germany are equal to the total suicides of the natives of all other foreign countries.

Comparative List showing Age, Method, and Sex.

	Males.																			
	Unknown.	5–10	10–15	15–20	20–25	25–30	30–35	35–40	40–45	45–50	50–55	55–60	60–65	65–70	70–75	75–80	80–85	85–90	Total.
Gunshot	...	1	1	11	37	28	28	23	24	24	19	17	11	8	3	2	....	...	237
Cutting throat	...	...	...	...	4	5	11	9	11	15	11	11	9	6	7	8	....	2	109
Drowning	2	...	...	3	4	12	8	8	7	8	10	3	3	6	1	1	....	...	76
Hanging	2	1	5	13	21	19	21	14	31	33	38	18	29	25	15	9	7	3	304
Poison	1	...	...	4	13	14	14	19	16	14	12	6	5	4	3	2	1	...	128
Not specified	3	...	3	3	19	24	13	15	27	29	23	10	16	12	4	3	2	...	206
Total—males	8	2	9	34	98	102	95	88	116	123	113	65	73	61	33	25	10	5	1060
	Females.																			
Gunshot	...	...	...	5	1	1	3	1	1	1	.....	...	1	....	...	....	....	...	14
Cutting throat	...	...	...	1	3	2	2	5	2	2	2	1	1	1	...	1	1	....	24
Drowning	2	....	1	6	6	1	4	6	3	4	2	6	1	1	...	....	....	....	43
Hanging	1	....	....	....	7	5	7	4	8	8	12	6	2	5	...	....	1	....	66
Poison	....	....	2	13	10	13	16	7	.....	6	2	....	4	1	....	1	....	....	75
Not specified	1	....	....	7	11	11	10	7	2	6	3	3	1	....	....	1	....	...	63
Total—females	4	....	3	32	38	33	42	30	16	27	21	16	10	8	....	3	2	....	285
Grand total—males and females	12	2	12	66	136	135	137	118	132	150	134	81	83	69	33	28	12	5	1345

From this table it will be seen that the greatest number of female suicides occur at the age of 30–35, while the greatest number of male suicides occur at 45–50, and that hanging is the most common method with men, and poison with women.

ARTICLE XII.

TWO CASES OF PERITONITIS APPARENTLY DUE TO DIPHTHERIA. By WM. C. DABNEY, M.D., of Charlottesville, Virginia.

IN the months of December and January last, there occurred in a large female school in this vicinity an epidemic of measles. The cases were, I learned from the attending physician Dr. Bowcock, generally mild, and all, so far as I know, terminated in recovery.

Following on the heels of the measles there occurred an outbreak of

diphtheria, which, with the exception of two cases, was so mild in character that the disease was not at first recognized, and Dr. Bowcock was not called in.

No cause could be found for the outbreak. It may safely be affirmed that no institution in the country is better managed, and nowhere is more attention paid to the hygienic surroundings of the pupils.

CASE I.—About the 10th of January, Miss M., one of the teachers, about 26 years old, was taken with quite a severe sore-throat, but as there was no diphtheria, so far as known, in this section at the time, no apprehension was felt. She was much better in a few days, and about the 15th her monthly sickness came on. This ceased on the 20th, and on the 22d she came to Charlottesville, a distance of six miles, on the train, and was very busy all day. She returned on the afternoon train much fatigued, and when she reached home she complained of "cramps" in her abdomen, but ate a hearty supper. In the night she suffered so much that she took some laudanum, and the next morning was well enough to be at breakfast.

During the day of the 23d she complained a good deal of pain, but Dr. Bowcock did not see her till the 24th, when he found her with considerable fever, marked tenderness in the lower part of the abdomen, a quick and rather weak pulse, and great nausea. Appropriate remedies were administered, and that night she seemed better, but on the following day, January 25th, he found her with an extremely weak pulse and in a state of collapse. I saw her at Dr. Bowcock's request about 3 o'clock on the afternoon of the 25th, and found her in a state of extreme prostration, pulse almost imperceptible; there was great restlessness and tenderness over the whole abdomen. She sank rapidly and died at 5 o'clock the same evening, consciousness being preserved almost to the last.

We were strongly inclined to attribute the peritonitis in this case to diphtheria, though neither of us had seen or heard of such a case before, nor had Dr. J. S. Davis, of the University of Virginia, who was kind enough to come to our assistance, but who reached the house only a little while before the young lady's death.

CASE II.—On the 5th of February following, I was called by Dr. Bowcock to see Miss O., one of the pupils in the school. She was suffering with diphtheria, and there was marked tenderness and pain in the abdomen especially about the lower part. Her pulse was very feeble, and her temperature high (I cannot recall the exact figure). Full doses of opium were administered and hot applications made to the abdomen.

Dr. Davis was kind enough to see the case with us the next day, and he agreed with us in the diagnosis, and gave, as we had done, an unfavourable prognosis. She threw up on the 6th a good deal of false membrane, and we were informed by one of those in attendance on her that she had passed membrane by the bowels also. The case ran a very similar course to the previous one, and the young lady died on February 7th.

The occurrence of peritonitis as a sequel or complication of diphtheria seems to be extremely rare, if we may judge from the fact that it is alluded to by very few writers on the subject.

In enumerating the different ways in which the disease may cause death

Dr. J. Lewis Smith does not mention peritonitis at all; possibly he may have been familiar with the complication but considered it so rare as to be practically of no moment. Dr. Jacobi, in his recent work on *Diphtheria*, is also silent about peritonitis.

Dr. Wardell, the author of the article on peritonitis in Reynolds's *System of Medicine*, quotes from Abercrombie an account of several cases of peritonitis occurring as a sequel to "diphtheria" which he observed in Edinburgh, in 1824. At the time the throat affection was supposed to be erysipelatous, but later investigations, Dr. Abercrombie states, showed that it was true diphtheria. He remarks on the similarity of the latter affection to erysipelas, and it may be well in this connection to mention that nearly all writers speak of the occasional occurrence of peritonitis as a complication of erysipelas and the eruptive fevers.

My friend, Dr. E. C. Carter of the army, has called my attention to the fact that Hillier in his work on *Diseases of Children*, p. 157, says, "among the rare sequelæ of diphtheria may be mentioned pleurisy, endocarditis, peritonitis, and erysipelas."

I believe it is also referred to by the author of the chapter on peritonitis in Ziemssen's *Cyclopædia*, but Oertel makes no reference to any peritoneal affection further than to say that Buhl in one instance found that "a considerable quantity of free blood had collected in the peritoneal cavity."

In the first case which I have mentioned in this paper we were at a loss at first to account for the peritonitis, though Dr. Bowcock, an unusually well-read and intelligent physician, suggested its probable connection with diphtheria. The diphtheritic attack in this case, however, had apparently terminated several days prior to the occurrence of the peritoneal inflammation, and in the mean time the patient had passed through a menstrual period and been exposed just afterwards to cold and dampness, and had, furthermore, undergone considerable fatigue. There is room, therefore, for doubt as to the directly causative influence of diphtheria.

In the second case I do not think that there can be a reasonable doubt that the peritoneal inflammation was due directly to the diphtheria, and it will be observed that membrane was passed by the bowels and ejected by vomiting during the height of the peritonitis. The young lady previously had been in perfect health, and she had been in no way exposed to cold, etc.; nor had she received any injury which might have produced such a result.

REVIEWS.

ART. XIII.—*Diseases of the Liver.*

1. *On the Bile, Jaundice, and Bilious Diseases.* By J. WICKHAM LEGG, F.R.C.P. London; Assistant Physician to St. Bartholomew's Hospital, and Lecturer on Pathological Anatomy in the Medical School. 8vo. pp. 719. New York: D. Appleton & Co., 1880.
2. *Diseases of the Liver and Portal Vein, being Volume IX. of Ziemssen's Cyclopædia.* New York: William Wood & Co., 1880.
3. *Clinical Lectures on Diseases of the Liver, Jaundice, and Abdominal Dropsy.* By CHARLES MURCHISON, M.D., LL.D., F.R.S. Second edition. New York: William Wood & Co., 1877.
4. *A Clinical Treatise on Diseases of the Liver.* By Dr. THEOD. FRIED. FRERICHS. Two volumes. The New Sydenham Society, London, 1860.

A COMPARISON of the most recent with the older works on the diseases of the liver, placed at the head of this article, will indicate the progress made in our knowledge, not only of the pathological states, but, also, of the functions, of this important organ. If we may interpret Dr. Legg's rather satirical expressions literally, it would not be an anachronism to place amongst these modern authorities the works of Galen, whose knowledge of the biliary functions seems to have been little inferior to our own. Says Dr. Legg, "those who come after us may judge whether the nineteenth century has made any real progress in this matter, compared with the age of Galen." Notwithstanding the temptation to which we are thus exposed, it would be quite impracticable to embrace the works of Galen in the scope of our inquiry. The great treatise of Frerichs, the appearance of which was, in a certain sense, the beginning of a new era in the clinical study of hepatic affections, is a convenient point from which to undertake a review of the subject. It would, indeed, be a labour of supererogation, at this period, to set before our readers an account of this monumental work. The position which we have assigned it, in the course of the historical development of the subject, will probably not be questioned. Murchison's volume, a strictly clinical treatise, is an obvious imitation of Frerich's treatise, which he had translated for the Sydenham Society, but it is, nevertheless, strongly characterized by those qualities which impart to the clinical work of English physicians a peculiar value—conscientious observation, fidelity of description, and a happy faculty of inference, which has almost the force and fruitfulness of original discovery. The volume on diseases of the liver, the ninth of the series constituting Ziemssen's Cyclopædia, is the last to make its appearance, and, therefore, represents the newest phase of German opinion and practice. As this volume is the combined work of Ponfick, Thierfelder, Von Schueppel, and Heller, it may be accepted as a satisfactory exposition of the subject from the standpoint of German thought. But our duty is, more especially, to present to our readers an adequate conception of the work of Dr. Legg; to show how far successful he has been in the account he gives of our present

knowledge, and to what extent he has enlarged the boundaries of our existing information. Dr. Legg must, we fear, be classed rather with the iconoclasts, and, as these terrible medical skeptics usually do, shatters ruthlessly our most treasured notions. But like all idol-breakers, he is more apt at destruction than at building up, so that one peruses his work with a definite sense of the waste of experimental inquiry, devoted with so much assiduity during ages to the elucidation of the hepatic functions. The reader, also, realizes that this ponderous tome, filled with vast and varied learning, is simply a record of mistakes, contradictions, and failures, and that a genuine knowledge of the functions of the liver is yet to be acquired. In the practical part of the work, we pass, it is true, from the domain of experiment and speculation, and find that here, at least, something is definitely known, but the same spirit of pessimism dominates fact, or supposed fact. In a single sentence he disposes of functional hepatic affections, on which Murchison delivered a course of lectures very recently, and which have occupied a large space in humoral pathology, from the time of Galen down. "Now," says Dr. Legg, "if we were to ask modern science what diseases were caused by the bile, all the answer would be jaundice and gall-stones; about any other nothing is known" (p. 662). To estimate with an approach to accuracy the formal opinions of any writer, we must know something of his psychological state, of the influences which have surrounded him and gradually made an impression on his modes of thinking and acting. Especially is this necessary in the case of Dr. Legg, who sums up, it is true, with judicial gravity the knowledge of all times, but his opinions are always coloured by a prevailing pessimism. We find in his book, unconsciously portrayed doubtless, the sources of his skepticism, the inspiration of his iconoclasm. "I am not one of those," he says (p. 664), "much tempted to follow the newest fashion in medicine; or in philosophy, morals, and religion; and still less in names." He tells us in his preface that he "has not fallen into the un-English virtue of consistency," and that "whatever imperfections there may be in the method followed, the reader must blame those Manichæan teachings, which, harmful as they are, are almost as old as the human race itself, and the germs of which seem to exist everywhere, ready to burst into a fresh life, even amongst those who claim to be most orthodox and sincere in their morals and belief." The work is dedicated to Prince Leopold in the usual loyal manner. From these characteristics, we may construct the mental type of the author, as the comparative anatomist does an extinct animal, from a few bones. He is a stanch tory, we doubt not, deeply imbued with the ideas of his class; his temperament melancholic, or bilious, if we may still use the much condemned phrase, and his modes of thinking, therefore, rather gloomy than sanguine. With him the illusions of life go for little, and what is called human knowledge seems to him little more than idle speculation. We must judge of his work, then, by the illumination afforded us in this glimpse of his mental and moral characteristics. But the reader must not suppose that we undervalue the work because we draw a rather unsympathetic picture of the workman. Dr. Legg's treatise is a really great book, exhibiting immense industry and research, and full of valuable information, as we will see, as we advance further in its examination; but we must not lose sight of the type of character producing it. Taking up this work then, in order, we will pass in review the several parts.

Dr. Legg treats only of the bile and the biliary diseases of the liver,

and does not include in his account of the functions of the organ the glycogenic, although constant references to the glycogen become necessary. His account of the chemistry of the bile is very full, and in the consideration of this topic his spirits do not fall so low, since in this respect our knowledge is more complete and exact than in any other connected with the liver. The bile contains certain acids—glycocholic and taurocholic—combined with soda; pigments, bilirubin and derivatives, and fats, chiefly cholesterin. The acids are not the same in all classes of animals, although closely allied. According to Strecker, whose researches are confirmed by Hoppe-Seyler, the nitrogenous bases of the bile acids are always the same—glycocoll and taurin. The acids of the bile are the largest and doubtless the most important of its constituents. Their origin must, therefore, have an important bearing on the question of the sources of the bile. As they cannot be detected in the blood, and have not been, according to the most recent researches, they must be formed in the liver. Next to the acids, the pigment of the bile is a peculiar constituent. Much confusion has arisen from the variety of names given to this colouring matter. Berzelius first entitled it cholepyrrhin, Simon biliphaein, and Städeler bilirubin, which has become the most generally adopted name, and is employed by our author. Bilirubin is converted by oxidation into biliverdin, which is the green pigment of the bile of herbivorous animals, and is also present with bilirubin in human bile. These two pigments are universally admitted to exist, but Städeler asserts that various pigments, named by him bilifuscin, biliprasin, bilihumin, and bilicyanin, are also to be found, but thus far he stands alone in this assumption. Various secondary products are obtained from bilirubin by the oxidizing action of nitric acid, which constitutes Gmelin's test. When bile is brought into contact with nitric acid, the yellow colour quickly changes into green, then blue, violet, red, and finally into a dull yellow. When bile is cast up by vomiting, it quickly becomes green by exposure to air, and sometimes this change takes place in the stomach. All of the pigments represented in this play of colours have been isolated. A very important question connected with the bile pigment is, whether it is preformed in the blood, and merely separated by the liver, or constructed in this organ. Opinions differ. Ponfick affirms (p. 9) that bilirubin is found in the blood, and the bile acids alone are produced in the liver. On the other hand, Legg says that the bile pigments are found only in the liver and in the bile (p. 85). It is difficult to account for Ponfick's blunder, since the analyses of Lehmann, of Hoppe-Seyler, and others, afford conclusive evidence that the blood of even the portal vein does not contain a trace of these pigments. The importance of this question is enhanced by the relationship which may exist between the blood colouring matter and the bile pigment—a topic which underlies the subject of hæmatogenic jaundice.

"The relation of the bile pigments to the colouring matters of the blood is that which has the greatest attraction for the physician, inasmuch as much of the doctrine of hæmatogenous jaundice depends upon the belief that the two bodies are the same. Doubtless, the idea that hæmatoidin and bilirubin are identical has much to recommend it to the notice of physiological chemists, but the notion has, I think, been asserted with scarcely sufficient proof. It is, however, an example of the rashness which characterizes the present generation of physiological chemists; they make up for the extreme uncertainty of their opinions by an increased boldness of assertion."

After an elaborate examination of the rather conflicting observations, Legg concludes that the identity of the two substances is disproved. Both

Kühne and Hoppe-Seyler, however, regard them as identical, and use the terms hæmatoidin and bilirubin as mutually convertible.

Although cholesterin, the principal fat in the bile, is widely distributed throughout the organism, it is probably formed in the liver. Such is the view of Beneke, supported by the chemical examination of Drosdoff, who found four or five times as much cholesterin and lecithin in the blood of the hepatic as of the portal vein. Lecithin is a fatty body containing phosphorus, not unlike Liebreich's protagon, and is a constituent of the bile. Our author is by no means a believer in Flint's doctrine of cholesteræmia. The readers of this Journal need not be told that Dr. Flint, Jr., regards cholesterin as an excrementitious substance entirely, and that it is an important function of the liver to secure its excretion. Flint is by no means without able support of his doctrine. Thus, Beneke holds that the excretion of cholesterin is a function of great necessity to the economy, but he does not go as far as Flint; on the contrary, he maintains that this substance, in company with its congener, lecithin, passes into the intestine with the bile, and is thence widely distributed throughout the body. Flint, however, maintains that cholesterin (he takes no note of lecithin) passes out with the feces, in the form of a substance styled by him *stercorin*. The retention of cholesterin, by reason of the failure of the liver to excrete it, according to Flint, causes cerebral disturbance like that of uræmia, and hence he entitles the complexus of symptoms produced by this retained excretion, *cholesteræmia*. Unfortunately for this theory, it has been found that the injection of a solution of cholesterin into the blood does not cause any disturbance of the system.

In Chapter IV. our author enters with some particularity into the physical and chemical characteristics of human bile. It is but rarely that human bile can be obtained in a fresh state free from any foreign ingredient. Of biliary fistula in dogs, we have had an abundance, but, for obvious reasons, it is very desirable to have an accurate standard of healthy human bile. But a single example of such a fistula in the human subject, free from any source of erroneous interpretation, has been recorded. This was a case of operation for empyema, the escape of pus being followed after some days by bile, which continued to flow for a fortnight, the feces for the same period being colorless. The case was reported by Westphalen, and the bile was examined by Jacobsen and Von Wittich. Legg sums up as follows our present knowledge of the physical and chemical characters of human bile, and as it is an excellent statement of facts, our readers will, no doubt, be pleased to have it placed before them:—

"Freshly secreted bile is a fluid—not viscid, of a golden-yellow, brown, or green colour; its reaction is usually neutral, sometimes barely alkaline; its specific gravity about 1010. It contains about two to three *per cent.* of solid matter, and has the power of changing starch into sugar. This power is lost if the bile remains long in the gall bladder; it then shows a deeper colour, is brown, and is of higher specific gravity, 1030 to 1040, and becomes viscid from the presence of mucus. The amount of solids in this cystic bile varies from eight to seventeen *per cent.*, but the relation of these solid constituents to one another does not seem to vary.

"The soda salts of the bile acids make up about one-half of the solid constituents; they may, however, vary from forty to seventy *per cent.* of the solids. It is known that these bile acids are formed by a combination with glycocoll and taurin, but whether the cholalic acid of man be identical with the cholalic acid of the ox is not known. It is certain that a taurocholic acid exists in the bile of man, although now and then it may be entirely absent, the glycocholic acid

being usually the dominating acid. This forms about three-quarters of the soda salts of the bile acids, while taurocholic acid forms the remaining quarter.

"It is known that bilirubin and biliverdin exist in human bile; the other bile pigments have not been found. Their amount has not been directly estimated. With mucus, it is thought to be from ten to fifteen *per cent.* of the solids.

"The fatty matters, the cholestearin, the soaps, and lecithin, make up from three to twenty *per cent.* of the solids. They seem to vary inversely with the amount of inorganic salts. The salts may be from fifteen to thirty-five *per cent.* of the solid bile; and of these salts, about two-thirds are made up of chloride of sodium. The remainder consists of phosphate of soda and lime, carbonate of soda, chloride of potassium, traces of magnesia and silica, and constantly traces of iron and copper. Urea, sugar, leucin, tyrosin, and albumen, are not found in health in human bile."

What is the source of the bile? Is it an excretion, or a secretion? That these questions yet remain for solution, seems extraordinary. An almost incredible amount of research has been devoted to the elucidation of the subject, and our author truly says, the results are so contradictory that we must needs fall back on the general principles of physiology. It has already been pointed out that the bile acids and pigments are not to be found in the blood, and hence the presumption is they must be formed in the liver. But, again, it is now known that these acids and pigments can be detected in minute quantity in normal urine, whence it is concluded that they must have existed in such minute quantity in the blood as to escape detection by our present means of research. But this fact does not obviate the difficulty, for these substances may have entered the circulation from the intestinal canal. As during the existence of jaundice these acids and pigments can be readily found in the blood, it would seem that if they were present in health they could hardly escape detection. Reasoning in this way, it appears conclusive that bile is a secretion, and that it is not merely separated from the blood, as Glisson taught, the liver acting merely as a sieve. Whether the blood of the portal vein or of the hepatic artery furnishes the material for the formation of bile, has been disputed with great persistence. Legg concludes to leave the subject where Bichat left it—that is, to be decided by future investigation, so it would appear that we are no nearer a solution of this problem than they were in Bichat's time. The actual amount of bile secreted can only be approximatively determined. In Westphalen's case of fistula in man, in which bile was discharged externally for two weeks, none apparently appearing in the feces, the daily amount of *solid* bile was about ten grammes, or one hundred and fifty grains. In another case of fistula in man observed by Johannes Ranke, in which admixture of foreign matters with the bile occurred to a greater or less extent, the quantity of *solid* bile was about twice the estimate in Westphalen's case. But this estimate, it is interesting to note, corresponds closely with the amount determined by Bischoff by comparison with results obtained by observations on animals.

The quantity of bile secreted is subject to great fluctuations. It is diminished by fasting; it is increased by taking food. The maximum secretion takes place some hours after food; according to some observers in four, according to others, in eight hours after eating. It seems clear, although there is some contradictory evidence, that more bile is secreted on a nitrogenous diet than on one of fat or of starch. An increase in the blood-pressure raises the production of bile; a diminution in the blood-supply and active muscular movements lessen the quantity of bile. The effect of irritation of the spinal cord, before division of the splanchnics,

seems to be inconsiderable—at first, the flow of bile seems increased, then lessened, but no change takes place, after these nerves have been divided. The very interesting and important fact, first observed by Bernard, that irritation of the orifice of the bile-duct in the duodenum with acid caused a great flow of bile, explains the outpouring of bile which occurs when the acid chyme enters the intestine.

In his chapter on "the office of the bile," Dr. Legg makes some satirical observations on the very contradictory statements which have been put forth by physiologists:—

"After the bile has been poured into the duodenum, and done whatever it is appointed to do, whether it be a positive harm to the process of digestion, a suggestion which in the present state of knowledge may be entertained; or be simply an indifferent fluid; or in some way aid the pancreatic juice; what becomes of the humour? Does it pass entirely out of the body with the feces, or is it absorbed again into the circulation?" (p. 147.)

After a discussion of the changes supposed by modern physiologists to take place in the bile when it reaches the intestine, he again remarks, in a despairing tone:—

"To what purpose then serves the bile? It cannot be looked upon solely as an excrement, for it has been seen what deep changes in nutrition follow its diversion from the body. There is no evidence that it is necessary for the completion of the process of digestion in the stomach or intestines; indeed it may be said by some physiologists that it does harm to the process in either viscus. The view that it acts as a sort of natural purge has little against it, but, at the same time, there is but little in its favour. As to the power of the bile in arresting putrefaction, it would seem that it must be small, if, as soon as it arrives in the intestines, it begins itself to undergo putrefactive changes. The view that the bile neutralizes the acid of the chyme must fall with the establishment of the fact that the bile is not alkaline but neutral in reaction. The only office which remains to it, is that of emulsifying fats, a property known to the Greeks 2200 years ago, and of changing starch into sugar. It is melancholy to find that in so many years nothing more is known with certainty as to the uses of this long-studied humour.

"It has seemed to me that physiologists are drifting into the belief that the office of the bile is not to act upon the chyme or to assist in the first digestion of aliments. Rather its office is to pass into the intestine, there to undergo changes itself, the products of decomposition being absorbed into the blood, and leaving the body by the urine. If it be admitted that the bile acids be decomposed before they be absorbed, it is most probable that they split up into glycocoll, taurin, and cholalic acid. The glycocoll, it has been seen above, is one of the bodies which, when taken into the intestine, appears in the urine as urea; taurin, in like manner, appears in the urine, probably furnishing the unoxidized sulphur of this secretion, though, according to Salkowski, it can no longer be thought that in man it is the source of the oxidized bodies, the sulphates. The cholalic acid would appear to leave the body by the feces; but a theory might be made by adopting Schiff's view of a circulation of the bile; supposing a salt of cholalic acid to be absorbed and conveyed to the liver, and there to unite with freshly-made taurin and glycocoll, and again to be excreted by the bile. Of the destiny of the bile pigments, little has yet been said; by some it is thought they undergo oxidation in the intestines; by others reduction; but the product of the change, whatever it may be, is called by Valair and Masius stercobilin; a pigment which is closely allied to that colouring matter of the urine, named urobilin by Jaffe. It thus becomes possible that the bile pigments after suffering whatever chemical changes they may be destined to undergo in the bowel, are absorbed into the blood and excreted by the urine as colouring matter, while the remainder passes out with the feces. The end of the bile would thus seem to be excretion by the urine; a view not altogether new, for it was taught by physiologists, sixteen hundred years ago, that the urine was formed in the liver and separated by the kidneys." (pp. 155 and 156.)

We have in this extract a specimen of Dr. Legg's style, and of the pessimistic spirit in which he regards the present state of the physiology of the bile. Of his industry in accumulating the so-called facts of physiological chemists, of his candour in expressing his doubts, there can be no question. But he has not entered the field of research for himself to attempt the elucidation of controverted points. It is true, the absurd anti-vivisection law has almost stopped physiological research in England, and our author, in his preface, acknowledges his obligations to the French authorities for permitting him to use the great laboratory of the veterinary school at Lyons. Yet the researches undertaken were not occupied with these obscure questions in regard to the sources and final disposition of the bile. It will be profitable to inquire, briefly, as time and space are inadequate, if our author, influenced by his dominating skepticism, has not rather underrated what is actually known of the office of the bile in the intestine. May we not here, in view of the contradictory statements, fall back upon certain general principles, as our author recommends under analogous circumstances? Some offices of the bile appear to be well understood. It has an antiseptic effect, and prevents the decomposition of certain foods whilst in the upper part of the small intestine. In this instance physiological experiment is in accord with clinical observation. Who does not know that when bile fails to reach the intestine, the stools are fetid from putrefactive decomposition. Bile assists the pancreatic secretion emulsify the fats, and powerfully aids the passage of "the molecular basis of the chyle" into the lacteals. It has been experimentally proved that oils pass through animal membranes and through plaster, wet with bile, with much greater facility than when wet with water merely. Wistinghausen first demonstrated this, and his experiments have been confirmed and extended by Dr. Williams in this country. Sir Benjamin Brodie, and afterwards Magendie, showed that when bile was diverted from the intestine, by a biliary fistula, fat did not enter the lacteals; except in very small amount, was afterward shown by Bidder and Schmidt. The last-mentioned observers also found that the fat largely escaped absorption and appeared in the stools. All the world knows what Schwann, afterwards Bidder and Schmidt, also ascertained by direct experiment, that when the bile is diverted from the intestine, the nutrition fails remarkably, and death ultimately ensues. Now and then, by the obstruction of the hepatic duct by a calculus, a pathological experiment is effected in man, the conditions of which are the same as when a biliary fistula is made in a dog, and the results as regards the nutrition and the failure of the vital powers are the same. Thus, as respects the disposition of fats, is the bile seen to have an important function. But this is really but a small part of the current knowledge of the hepatic functions.

Dr. Legg does not extend his inquiries to another important function —the glycogenic—although he makes necessarily many important allusions to its connection with the biliary. Since the discovery by Bernard of the glycogenic function of the liver, there have been numerous investigations in regard to the source, nature, and functions of this substance. Have we any exact knowledge on this point? It must be admitted that we have more speculation than actual information, but some things are known of which Galen could hardly have dreamed. Our readers are doubtless familiar with the discussion which has taken place, as to the seat of the production of glycogen, and its relation to, or independence of, the biliary function. Bernard held that the two functions were indepen-

dent, and some of his followers, that certain hepatic cells secrete bile, and others glycogen. Pavy, the English physiologist, maintains that glycogen is found in the liver as a post-mortem change; and Flint, in papers with which our readers must be acquainted, has shown that it is present at the shortest time possible for the most expert operator to obtain a portion of the organ for examination. Recent researches, especially those of Kühne and Heynsius, have proved that the two functions are intimately associated, for if the bile be diverted from the intestine, the glycogen is greatly decreased in amount, or disappears from the organ entirely. New light on the origin and office of glycogen has been cast by late researches of Pavy (*Lancet*, July 2 and 9, 1881), who has shown, contrary to existing belief, that glycogen is not converted to any appreciable extent into sugar in the blood, and that it exists as a normal constituent in that fluid. He finds it very widely distributed throughout the organism—"occupying a parallel position to albumen, viz., existing in the colloid state, and thus adapted for retention within the body, instead of passing off as a diffusible substance like glucose tends to do." Its importance as a ready means of producing force seems to be indicated in these facts, and here we certainly have important light cast on the functions of the liver.

Dr. Legg devotes a chapter (VIII.) to the actions of drugs on the secretion of bile. We find no new observations on these remedies; but he faithfully records the observations which have been made by others, including those on Westphalen's human subject, Scott's, who first studied the effects of supposed cholagogues on dogs with biliary fistula, Rohrig's, the Edinburgh Committee's, and especially Rutherford's. Whilst there are minor exceptions, on the whole there is a remarkable unanimity in the results of these investigations. It can no longer be said, that the effects obtained by experiment on dogs with biliary fistula, are not applicable to man. In Westphalen's case of human biliary fistula (*Deut. Archiv für klin. Med.*, Band xi. p. 598 *et seq.*) a dose of twenty grains of calomel rather decreased the amount of bile discharged. This is the uniform result of the action of purgative mercurials, except corrosive chloride in dogs. Purgatives generally lessen the flow of bile, but the resin-bearing cathartics, as a class, have distinct cholagogue effects, although they vary in the degree of the action. The following list includes the substances having a distinct power to increase the flow of bile:—

"Aloes	Corrosive sublimate
Podophyllin	Muscarine
Rhubarb	Nicotine
Colchicum	Physostigma
Colocynth	Euonymin
Jalap	Sanguinarin
Ipecacuanha	Iridin
Benzoates	Leptandrin
Salicylates	Baptisin
Sulphates of potash and soda	Photolacin
Phosphates of soda and ammonia	Hydrastin
Dilute nitrohydrochloric acid	Juglandin."

In this list we recognize remedies which have long been known to stimulate the hepatic functions, and others are equally conspicuous by their absence. Thus possessed of a group of remedies, which may be justly regarded as cholagogue, the question arises, What will we do with them?

"It has been seen," says our author, "that the wish to increase the amount of bile excreted by the liver comes of a most venerable antiquity; but it may now be asked, in what diseases or in what states would good be done to a patient if the amount of bile poured into the duodenum were increased? It seems to me that it would be judicious to put aside at once all organic diseases of the liver, such as cirrhosis, amyloid degeneration, and the like; for in them the same kind of evil would follow the use of a stimulant to the liver, as of certain diuretics in Bright's disease. . . . Then in cases of jaundice, it would surely be undesirable to attempt to increase the secretion of bile; for the bile passages being already overfilled, harm would be done by pouring fresh bile into them. Then comes the long list of disorders, which the public love to think due to 'the bile,' and called 'biliousness,' the symptoms of which are really due to a catarrhal state of the gastro-duodenal mucous membrane as will be seen in the chapter on bilious disorders."

Our author, indeed, can conceive of no condition in which stimulation of bile-flow may be desirable, except "at the end of an attack of jaundice when the stools have begun to show some appearance of returning colour, but the conjunctiva, skin, and urine of the patient still remain yellow."

As the subjects of biliousness, so-called, and the action of cholagogue medicines, are important practical topics in this country, especially through the west and south, it may be desirable to develop at this point, the real state of scientific opinion on these questions. Dr. Legg devotes the last chapter of his work to "Bilious Diseases," but clearly, this department of the subject has close relation to that which we are at present considering, and may therefore be appropriately taken up now. The existence of bilious diseases, and the belief in biliary derangements, in too little or too great supply of bile, are deeply rooted in the convictions of men, and have been, from the time of Hippocrates, in whose system various kinds of bile played an important part. Bartholin was the first of the modern school to dispute the Galenical views. But, as has been pointed out, the reaction has gone in the opposite direction, and now various conditions of the bile are, in common professional and popular belief, influential agents in disease production. The swing of the pendulum of professional beliefs is again starting away from this point, and the "bilious state," and "biliousness," are strongly doubted as morbid entities by the new school of physiological physicians. Frerichs treats of hyperæmia of the liver due to gastro-intestinal catarrh, but we do not find in his work any references to the functional disturbances of the liver such as in England and in this country are supposed to exist under the term biliousness. Murchison, in his very suggestive and interesting Croonian lectures, holds to the belief in such derangements. A large portion of the physicians in this country, especially those practising in malarious regions, are unquestionable believers in biliousness, as a distinct morbid state. Our author, Dr. Legg, maintains, that "there is no evidence that the disease is accompanied by any increase or decrease, or any change whatever, in the secretion of the bile." His view, that the condition is really gastro-duodenal catarrh, is probably correct in large part; but not every case of this kind is accompanied by a muddy complexion, yellowness of the sclerotic, and light-coloured stools, indicating biliary derangement. There are two forms of the condition, then—one limited to the gastro-duodenal mucous membrane; the other, accompanied by signs of biliary derangement, and therefore, doubtless, extending to and involving the orifice of the *ductus communis choledochus*. In the latter sufficient swelling of the mucous membrane about the orifice of the duct exists, to hinder, to a greater or less extent, the escape of bile into the duodenum, although not to prevent

it entirely. During many years of practice in malarious localities, the reviewer saw numerous examples of this form of gastro-duodenal catarrh, or biliousness. When, in such cases, the whole tract of the hepatic duct is involved, we have the well-known catarrhal jaundice, which, for obvious reasons, is much less apt to occur than catarrh limited to the duodenum. By Murchison (p. 565) symptoms of the same kind are referred to *lithæmia*, that is, imperfect oxidation, the accumulation of uric acid and urates in the blood, and their excretion by the urine. Murchison admits that "these symptoms are the more likely to occur if the patient be what is commonly known as a 'generous liver,' if he takes little exercise in the open air, or if he have much mental work." The complexus of symptoms, given by him, are those of gastro-duodenal catarrh, and he enumerates amongst them, weight at the epigastrium, flatulence, heart-burn, a furred tongue, metallic taste, headache, change in the colour of the stools, etc. It can scarcely be doubted that Murchison has ascribed to lithæmia the symptoms belonging to gastro-duodenal catarrh, and that he confounds effects with causes. The final conversion of nitrogenous materials into urea, is the work of the liver, it is true, probably, but when gastro-duodenal catarrh exists, the peptones are imperfectly prepared, and here is the first step in the morbid process.

In determining the bilious state, much assistance is usually afforded by an inspection of the stools, but all modern authorities are agreed that this information may be very misleading. Legg says:—

"To tell the truth, very little knowledge exists as to the cause of the colour of the feces, either in health or in disease. It is indeed known that a few drugs, such as iron or bismuth, blacken the stools, and that complete obstruction to the common duct will cause them to become clay-coloured; but the other causes of the varying colours remain almost unknown The only proposition that can be safely upheld is, that bile is not the sole cause of all the change in colour." (p. 661.)

As far as the condition of biliousness is concerned, the change in the colour of the stools is eminently characteristic and can be referred to the absence of bile.

Next to the belief in the existence of biliousness as a distinct morbid state, is the conviction of a large portion of the medical profession in Great Britain and this country, that mercurials, particularly blue pill and calomel, are especially effective in removing it, and restoring the normal. No point in therapeutics has been more fully discussed, and, hence, it deserves careful consideration at our hands. The evidence that calomel and blue pill do not increase but diminish the secretion of bile, has already been placed before the reader. But two facts directly bearing on the question at issue, are now well-established: the stools are changed in character by mercurials; the symptoms of biliousness, or gastro-duodenal catarrh, disappear under their use. If these remedies, then, do not act on the liver, how explain their good effects? We believe, and have of late years taught, that the explanation is as follows: The colour and odour of the stools begin to have their usual characteristics in the lower part of the ileum and especially in the cæcum. Mercury increases the activity of, and is largely eliminated by, the enormous glandular apparatus of the ileum and cæcum, and to this action is to be referred the change in the colour of the stools. Small doses of calomel ($\frac{1}{20}$ to $\frac{1}{4}$ grain) have a remarkably sedative effect on the gastro-intestinal mucous membrane, just as powdered calomel will allay an inflammation of the conjunctiva. Other

remedies act favourably—the salines for example—and all the world knows the good effects of a rigid diet and of abstinence. Since his demonstration of the cholagogue action of euonymin, Rutherford speaks strongly in behalf of a dose of this substance at bedtime and followed by a saline in the morning.

As "bilious" is a misleading term, Legg urges that its use be discontinued. (p. 663.)

In Chapter IX., Dr. Legg gives an interesting account of the physiological action of the bile, in the course of which he introduces a good deal of experimental evidence. This is a comparatively recent subject. Frerichs, in an appendix to his work, records the results of various experiments, but great progress has been made since in the knowledge of the physiological action of the bile. Röhrig, Kühne, Hünefeld, Traube, and many others, have contributed facts. As the effects of the bile, studied physiologically, serve to illuminate various points in hepatic pathology, and have therefore an immediate practical application, it may be desirable to summarize the ascertained facts. Bile exerts a solvent action on the red blood-corpuscles, but this result is due to the bile acids and not to the pigments. Muscles lose their contractility when acted on directly by the bile acids, but this effect is chemical, and does not occur when they are acted on through the blood. It is well known that the pulse of jaundice is slow, and much experimental work has been done to prove the cause. By Traube and Ranke this effect was attributed to the action on the muscular tissue, and by Röhrig, on the ganglia of the heart. The conclusion of Röhrig has since been confirmed by the experiments of Steiner and of Legg. As regards the influence of the bile acids on the blood pressure, much depends on the vessel into which they are introduced; when injected into the jugular vein, the pressure falls, and when injected into the carotid artery the pressure rises. No conclusions can be safely drawn from such observations. The temperature is decidedly reduced by the bile acids. On the brain, they act as a narcotic, causing drowsiness and stupor, and they lower the reflex function of the spinal cord. The cerebral effects caused by the bile acids should be carefully distinguished from the symptoms due to thrombosis of the pulmonary artery when the bile acids are thrown into the jugular vein. The bile pigments seem to be physiologically inert.

Thus far we have been occupied with topics which merely prepare the way for the consideration of hepatic diseases. Much of this has been physiological and speculative, yet we will find at all points that the obscure problems waiting for solution are closely connected with the most practical questions.

Frerichs, as is well known, opens up the subject of liver diseases by discussing jaundice as a symptom. Dr. Legg approaches the subject in the same way, and in Chapter X. discusses the etymology, history, and etiology of jaundice. Jaundice may depend on several conditions. In the first place, it has been assumed that it may be produced in the blood by changes in the colouring matter—hæmatogenous jaundice—as for example, the jaundice in pyæmia and putrid fevers. According to one view, the liver merely separates the bile from the blood, and hence jaundice may be produced when the organ can no longer perform this office. The third, and most generally accepted view is that which ascribes jaundice to the absorption into the blood of bile previously formed by the liver. The subject of hæmatogenous jaundice possesses a high degree of interest.

Although not wholly a modern theory, Virchow may be regarded as its real founder. There are many reasons for a belief in the existence of this form of jaundice, chief among them being the close resemblance of hæmatoidin and bilirubin. As is usual, physiological chemists of equal eminence, differ as to the identity or resemblance of these substances. Virchow, Funke, Valentiner, and some others, maintain that in crystalline form and in reaction, the two bodies are the same, but, on the other side, Strädeler, Preyer, Holm, and others, affirm that they differ in these respects, and especially in their spectra, which are widely apart. If there be an identity in composition and structure between hæmatoidin and bile-pigment, the introduction of any agent into the blood which would set free its colouring matter, must result in the production of jaundice. This has not been accomplished. Various agents set free the hæmoglobin, but jaundice has not followed, although the bile-pigments, it is said, appear in the urine. But this point is also disputed. Frerichs, Kühne, Munk and Leyden, found that the bile-pigments were present in the urine, but J. Steiner and Legg were unable to detect them under the same circumstances. The confusion is probably due to the fact that the blood-pigment reacts in a similar manner to bile-pigment, and still more, to the fact that in dog's urine there is normally present a substance which reacts in the same manner as bile-pigment. After a careful survey of all the evidence, our author concludes as follows:—

"The grounds on which the theory of hæmatogenous jaundice have been set up are, to my mind, altogether insufficient. It cannot be said that the origin of the colouring matter of the bile, from that of the blood, is proved; indeed, of late, the course of discovery has been rather against their identity than in favour of it. And until it has been shown that bile pigment has its source in the blood-corpuscles, it will be the duty of the practical physician to reject the theory of hæmatogenous jaundice."

Frerichs came to similar conclusions twenty-five years ago, and urged similar reasons for rejecting this theory.

"As regards the spontaneous conversion of the red matter of the blood into bile pigment in putrid diseases, no objection can be made to the possibility of such an event, considering the intimate relations which have been shown to exist between hæmatine and cholepyrin [bilirubin]; but positive proofs of it are wanting. As yet no one has succeeded in manufacturing bile pigment from the red colouring matter of the blood, although the products of decomposition of both are the same. The yellow matter, however, which in cases of pyæmia circulates with the blood, and is voided in the urine, is at least in most cases identical with bile pigment, and participates in all the properties of this substance. But even were the conversion of hæmatine into bilirubin, under the operation of certain agencies possible, still it remains to be proved that this metamorphosis really takes place in the course of putrid diseases within the bloodvessels of the living body." (Vol. i. p. 84.)

The labours of twenty-five years have, therefore, not cleared up the doubts; only it may with justice be said that the great mass of experimental inquiry has not been wholly in vain, since the doubts regarding the existence of hæmatogenous jaundice have increased. The results of physiological research have, however, not been so barren in that form of jaundice known as jaundice by suppression. It has been held, quite down into our own times, by Bamberger, Trousseau, Budd, and more recently by Moxon (*Transactions of the Pathological Society of London*, vol. xxiv. p. 133 *et seq.*), that the bile is formed in the blood, and merely strained off by the liver; hence, jaundice results when the liver is inca-

pacitated from the performance of this function. We have already given the experimental data which negative this theory. Neither the bile acids nor the bile pigments have been found in the blood, not even the blood of the portal vein. The third theory of jaundice is that which supposes an absorption into the blood of bile already secreted by the liver, some obstacle existing to prevent the passage of the bile into the intestine. This theory best harmonizes all the facts, and is now universally admitted to be true.

Very little obstruction suffices to pass the bile into the blood, rather than into the duodenum. It is not necessary that the duct be closed; if there be some swelling of the mucous membrane so that the flow of bile is impeded, it is sufficient to start the flow into the blood. From this fact we get a clear understanding of the varying degrees in which with gastro-duodenal catarrh there may be implication of the biliary function. Jaundice may also be caused by a considerable diminution in the pressure of the bloodvessels of the liver. Frerichs advocates this theory. It is assumed that the bile passes in the direction of least resistance, which will be towards the vessels, when the blood-pressure is low. This fact has been experimentally shown by Heidenhain, and such is the mode of explaining the jaundice caused by mental emotion, by bites of serpents, and by loss of blood.

In Chapter XI. our author treats of the symptoms of jaundice, and in Chapter XII. of the complications. We pass over these, although full of interesting matter and rich in suggestion, except to mention merely that he gives an excellent account of Xanthelasma, illustrated by a beautiful chromo-lithograph. In Chapter XIII., on the morbid anatomy of jaundice, we find several subjects of recent development, which have an important bearing on practice. We should not fail to direct the attention of our readers to these points. We refer to the histological changes which take place in the liver consecutive to obstruction of the ducts. These changes have been studied by Charcot, and by Legg (the latter is, we believe, entitled to priority), by experiments on animals, as well as by observations on man. Before Legg's special studies were undertaken, Oskar Wyss had, however, distinctly referred to the changes which take place in the interlobular connective tissue (*Virchow's Archiv*, Band 35, p. 553; *Beitrag zur Histologie der icterischen Leber*). Dr. Legg, with characteristic fidelity, refers to these observations, and assigns them their proper position, notwithstanding they barely relate to changes which he has laboriously described. There is, doubtless, some amiable sarcasm hidden in the following paragraph:—

"The histological changes of the liver in obstruction to the duct had been until lately but little studied, though at Paris we are told that within the last three years the subject has become the order of the day. This is no doubt owing to the experiments of Charcot on this point, which have everywhere drawn much attention."

Catarrh and dilatation, to a greater or less extent, of the ducts, pigmentation of the liver, and jaundice of the hepatic cells, have of course been pretty thoroughly described. As regards the changes of the connective tissue, its overgrowth and the consequent hypertrophic thickening and enlargement of the organ, caused by obstruction of the bile ducts, we owe the first important studies to Dr. Legg, who was soon followed by Charcot in the same vein. These changes may be but trivial in temporary obstruction of the ducts, but in long-standing cases they become consider-

able. Dr. Legg finds that in dogs, whose common duct is tied, the overgrowth of connective tissues goes on rapidly, and attains extensive proportions. The explanations which have thus far been brought forward of this hyperplasia have not been satisfactory.

The changes caused by obstruction are not limited to the connective tissue. The hepatic cells participate. Leyden describes fatty infiltration of the cells, and his statements are confirmed by Hayem and Cornil. Wyss, Meyer, Legg, Charcot and Gombault find that this fatty infiltration is not constant, and not so extensive as Leyden supposed. The cells waste and become granular, the protoplasm gradually disappears, and sometimes they have a shining, vitreous appearance. When the obstruction is permanent the cells may completely disappear, and are replaced by a granular and fatty detritus.

Although the mechanism by which these changes are wrought remains unexplained, the facts themselves have a high degree of clinical significance. We see in these histological changes an imperious necessity for the prompt removal of the causes of obstruction whenever it is practicable to do so. We learn further how successive attacks of duodenal catarrh, with swelling of the orifice of the common ducts (the simplest cause of obstruction) will, in time, bring about serious changes in the hepatic structures.

Characteristic alterations also occur in the kidneys in cases of jaundice. Legg finds that nothing can be added to the accurate account given by Frerichs. Besides the straining of the organ in various degrees, the epithelium of the tubercles is filled with pigment, and undergoes fatty degeneration.

In Chapter XIV., on the functions of the liver in jaundice, Dr. Legg introduces much valuable matter, which brings into sharp contrast the author's pessimism, and the appreciation of the rich results obtained by modern investigations. Dr. Legg considers in order the disturbing influence of jaundice over the hepatic functions, beginning with the glycogenic. This he regards as the most important of the functions. It is lessened in activity, or entirely arrested when the ducts are obstructed.

"In all cases I found that whether the animal died within a few hours or a few days after ligature of the bile ducts, in all cases alike, glycogen was absent from the liver."

He is habitually cautious in applying the results of observations on animals to the conditions in man.

"It becomes a question how far this fact in animals may be applied to jaundice in man, when there is sometimes evidence from the presence of colour in the stools that the obstruction to the duct is not complete. In these and other cases the phenomena seem best explained by supposing that the glycogenetic function of the liver is not altogether abolished, but rather impaired. Even in cases of simple jaundice the patient wastes and loses flesh rapidly, and this seems best explained by supposing a great impairment, if not destruction, of the glycogenetic function. Glycogen is always found in growing parts, and its importance to nutrition cannot be doubted."

It has already been shown that there is an intimate relation between the biliary and glycogenic functions—that they are interdependent. The presence of bile is necessary to the production of glycogen. As it has been shown that in jaundice the diminution in the production of glycogen is in proportion to the extent of damage suffered by the liver, so also in the same ratio does the bile-producing function of this organ undergo

abatement. The quantity of bile acids and of pigment excreted by the urine is greatly below the production in health. The reason is, there is much less formed. After a time the jaundice may cease simply because the liver is unable to produce any more bile.

Another function of the liver impaired in jaundice is the heat function. Claude Bernard first demonstrated the important fact that the temperature of the blood in the hepatic veins is higher than in any other part of the body. The great production of heat is unquestionably due to the active chemical processes connected with the formation of glycogen and of bile. It necessarily follows, if these two functions are lessened in activity, or suspended entirely, the heat produced must be less. This view is confirmed by the well-known clinical fact that in jaundice the temperature is subnormal.

Our author, notwithstanding the pessimistic view he takes of the progress of knowledge in respect to hepatic physiology, admits the existence of a fourth function—that of sanguification. The blood of the hepatic vein contains very little fibrin, and will hardly form a clot; it contains a relatively larger proportion of red and colourless corpuscles, and the extractives and fats are present in greater quantity than are found in the portal. As in jaundice the relative proportion of red corpuscles is much decreased, this result may be ascribed to the interference with the process of sanguification, which occurs when the liver is diseased.

Passing over the diagnosis and prognosis of jaundice, which are the topics of Chapter XV., we come to the treatment of jaundice, which occupies Chapter XVI. In this chapter Dr. Legg's iconoclastic spirit has abundant opportunity. After giving an account of the method of treating jaundice, which he calls "rational," he deals some destructive blows against the "empirical treatment." His method, in brief, consists in a careful regulation of the diet, excluding fats, starch, and sugar; in the administration of the milder preparations of iron to remove the anæmia; in the use of salines and alkaline mineral waters, to increase elimination by the kidneys; and in attention to the skin, to maintain its functions. That this method of treating the most usual form of jaundice—the catarrhal—is *rational*, we fully believe. That it will yield equally valuable results in other forms of jaundice, we doubt. Dr. Legg condemns the use of purgatives, except a dose or two to remove constipation, and includes in his anathema calomel, and the so-called cholagogues of vegetable origin. He can see no good in remedies which stimulate the hepatic functions when there exists an obstacle to the escape of bile, or when disease has attacked the organ itself. In the present state of knowledge, these reasons certainly seem to be conclusive. He is equally opposed to the use of emetics, but has a friendly word for the mineral acids, because, probably, a rational explanation of their utility has been given in the experiment of Bernard, who found that the application of an acid to the orifice of the common duct in the intestine caused an active pouring out of bile.

From jaundice, a symptom, Dr. Legg passes to the diseases of the liver, beginning in Chapter XVII. with *icterus simplex*. This he defines to be a self-limited disease, of two or three weeks' duration, always terminating in recovery. In the discussion of the causes, he expresses doubts, as might be expected, in regard to the influence of emotional excitement. The historical examples of jaundice caused by anger, fear, sudden joy, and other mental and moral emotions, he thinks may be explained on other grounds. He does not at all allude to the influence of malarial in-

fection. That simple jaundice, without febrile disturbance, is caused by the imbibition of malaria in some subjects, is a fact, which any one who has practised in the intensely malarious localities of the Mississippi Valley will substantiate. In certain other subjects, malarial infection will induce chronic splenitis (ague cake); also, without the objective phenomena of fever, and as the sole evidence of malarial toxæmia. Legg admits, with Frerichs, that in a considerable portion of cases the real cause of the jaundice is catarrh of the bile ducts, originating often, probably most frequently, in gastro-duodenal catarrh. In malarious regions, again, this morbid state is very common. But the paludal poison is not the sole factor in its causation. Gastro-duodenal catarrh is a result of excesses at table, especially in the use of highly-seasoned and rich dishes, and it is readily produced by the habitual indulgence in spirituous and malt liquors. We have already pointed out that biliousness, from the simplest case of indigestion so called, up to fully-developed jaundice, may, and does usually, depend on gastro-duodenal catarrh causing more or less obstruction against the escape of bile into the intestine.

The importance of catarrhal swelling of the mucous membrane, or blocking of ducts by mucous plugs, has been recognized from Van Swieten down. Among moderns, Virchow has done most to demonstrate the existence of catarrhal jaundice. Dr. Legg comes to the conclusion "that a catarrh is a common cause of jaundice, cannot, I think, be disputed; but that it is the cause of all cases of simple jaundice still lacks proof; a difficulty not likely to be overcome soon, as opportunity for examination after death is so rare." We venture to add, that this cause will be found in action in all cases of simple jaundice, although other factors may have a determining influence.

Simple icterus sometimes prevails as an epidemic, under circumstances usually indicating the presence of poisons generated by decomposing vegetable and animal matters. When uncomplicated it does not differ from the sporadic form.

The most interesting disease in the group of hepatic disorders, considered from the point of view of the disputed functions of the organ, is acute yellow atrophy. This disease is a pathological vivisection, in which the organ is summarily removed from its associated organs. The widespread confusion which then results affords us a conception of the place occupied by the liver in the system of man. This disease is, therefore, deserving of the exhaustive examination given to it by our author, who devotes to it 140 pages, or one-fourth of his work.

As is his custom, Dr. Legg, who is fond of philological disquisitions, first discusses the name, and the synonyms in various languages. He does not approve, strangely enough, of the name proposed by Prof. H. C. Wood, M.D., in an article in this Journal (vol. liii. p. 418), viz., *leucinosis*, because leucine is found in the blood in this disease, and he remarks, rather irreverently, "I am glad to find that in this he has no follower."

"Acute yellow atrophy is one of the rarest diseases known to man." There is good reason for believing that some of the reported cases were examples of phosphorus poisoning. This has seemed probable, since in undoubted cases of phosphorus poisoning, the chemists have been unable to detect this substance in the bodies of the dead. A heated controversy has been going on in Germany over this question. "Liebermeister and Ossikovszky assert that no distinction can be drawn between acute yellow atrophy, phosphorus poisoning, and yellow fever; Schultzen and Riess

and Winiwarter declare that there exist certain means, both before and after death, for distinguishing between them." There must be an extraordinary similarity, nevertheless—a fact of high interest from the point of view of causes of this singular malady. This fact is of great importance in another aspect. Phosphorus is much and freely prescribed in medical practice, and children have a strange *penchant* for eating matches—whence the question of yellow atrophy or phosphorus poisoning might arise. The statistics of Frerichs and those collected by Legg, prove that the female sex is more liable to this disease than the male. In 100 cases collected by Legg, there were 69 women or girls. Thierfelder says there are "fully one-half as many more cases amongst women than amongst males." The period in life most liable is from 15 to 30. All concede that pregnancy is the most important predisposing cause, the greatest number of cases occurring in the sixth month. A local and family predisposition has been noted, also. That a peculiar poison generated under conditions and in a form now not known, is the real pathogenetic factor, seems highly probable, in view of the history and behaviour of the disease; still more because of the production of a precisely similar malady by phosphorus. Interesting as it may be to pursue this topic, we must rather devote our attention to this disease as a means of casting a much needed illumination on the functions of the liver. We have already stated that it may be regarded as a pathological vivisection. We must now form an adequate conception of the kind and degree of damage sustained by the organ, and compare the changed with the normal functions. Unfortunately for the deductions to be made as to the part enacted by the liver, this disease is a general disorder, in which the liver suffers in common with many other organs, but in a more complete degree than any other. The liver becomes small, flaccid, yellow, and fatty. Through the yellow are scattered islets of red tissue, firmer and tougher, and apparently more shrunken. In an advanced state of the disease, the hepatic cells entirely disappear, only granular detritus marking their site. During the progress of the changes, the cells become fatty, and, at the outset, before the liver has wasted or even changed materially in its appearance, the microscope must be invoked to make the diagnosis. Whether a hyperplasia of the connective tissue of the liver also occurs, is warmly disputed, the weight of authority being in favour of the position that an increase does take place, when sufficient time is afforded. The muscular tissue of the heart, the renal epithelium, and other organs and tissues undergo a similar granular and fatty degeneration. Without commenting on the obvious disturbances in the functions of the other organs, we consider the changes which ensue by reason of the cessation of the hepatic functions. If the disease is not advanced, some bile may still flow into the intestines, but in a great majority of the cases, Legg, as all other authorities, states that the stools are grayish or clay-coloured; or they may become tarry or blackish, says Frerichs, from admixture with blood. Thierfelder makes the same statement, although he admits that "occasionally" they may be bilious. Here, indeed, Dr. Legg expresses an opinion in conformity to common experience, but at variance with his earlier observations, on which we have commented, namely, that the stools afford no indication of the presence or absence of bile. As the disease is of short duration, all of the bile produced flows into the blood, and the jaundice persists until death. If the disease were more protracted, and the liver suffered the same damage, there would come a time when the jaundice must cease, for, the bile being no longer produced and the kidneys

continuing to excrete it, all would disappear. The excretion of bile pigment must, however, be slow, in a disease in which the renal tubular epithelium is so quickly disintegrated. The conclusion which physiological chemists have, provisionally, at least, reached in regard to the bile acids, is that they are split up in the intestines into glycocoll, taurin, and cholalic acid; the glycocoll is excreted by the urine as urea, and the taurin, also, finds exit in the urine as an unoxidized sulphur compound, whilst the cholalic acid is discharged with the feces. All of this is changed in acute yellow atrophy. We owe to Frerichs the remarkable fact that the urea is greatly diminished, and sometimes entirely disappears from the urine in this disease. It is true there are some contradictory observations, but on the whole it seems clear that although urea may be present it is much less in amount than in the normal. Intermediate in the process of tissue metamorphosis are leucin and tyrosin, supposed to be steps in the transformation of albuminous substances into urea. We owe also to Frerichs the demonstration of the fact that these bodies appear in the urine, taking the place of urea. Tyrosin appears to be more frequently absent than leucin, which most observers agree is constantly present. Schultzen and Riess found, also, in the urine a peptone-like substance. These physiological chemists regard the presence of leucin and tyrosin in the urine as significant as albumen in Bright's disease, and sugar in diabetes. Prof. H. C. Wood, M.D., is disposed to the same view for leucin, and he would entitle the disease *leucinosis* (see the No. of this Journal for April 1867, p. 418), a term of which, we have seen, Dr. Legg especially disapproves. Thierfelder, speaking on this relation of leucin to urea, says: "We can hardly avoid tracing a connection between its appearance in the urine and the absence of the urea, and regarding a portion at least of the leucin as representative of the urea. That the actual production of the latter substance, and not merely its elimination from the blood, is interfered with, is extremely probable, because in other diseases in which the degeneration and functional derangement of the kidneys is quite as considerable as it is here, such a disappearance of the urea from the urine is not observed." (p. 288.) Dr. Legg expresses similar opinions, tinged in this case, we believe, with a judicious skepticism.

"The disappearance of the urea from the urine together with the inorganic salts, taken together with the appearance of leucin and tyrosin, and, according to Schultzen and Riess, of a peptone, is a matter of the very deepest interest. In the present state of physiology, the place where the urea is formed is most uncertain, but the disappearance of urea from the urine leaves no room for surprise in a pathological state where every gland and every muscle is found acutely degenerated. It is interesting to observe the appearance of lower grades of tissue metamorphosis, such as leucin and tyrosin, in the urine, which some physiologists seem inclined to believe are early steps in the every-day change of albumen into urea."

As the liver has some office in connection with sanguification, and the maintenance of animal heat, it is important, from our present stand-point, to note the changes in the blood and in the temperature in this disease. As usual, there are contradictory statements, but we extract from the mass the fact that a diminution of the red and an increase of the white corpuscles take place; that the red corpuscles are changed in form; and that leucin, sometimes also tyrosin and urea, and cholesterine, are found. The hemorrhagic diathesis, which is a pronounced symptom, is not due, it is conceded generally, to the state of the blood, but to important alterations in the walls of the vessels.

In this as in other cases of jaundice, the temperature falls below normal, and remains so until the nervous phenomena develop. This decline in temperature means an arrest of those heat-producing processes in the liver which cause the blood of the hepatic vein to have a higher temperature than the blood of the portal. Furthermore, the glycogen, which we have seen is so widely distributed, so important to nutrition, and which serves to supply a readily available force by its oxidation, is no longer produced, at least, in any considerable quantity. Hence the failure of the liver to produce this material, affects heat-production throughout the organism. With the development of the nervous phenomena near the close of the case, some elevation of temperature occurs, and immediately after death a considerable elevation has taken place in some reported examples. It is uniformly observed that the temperature during the time when jaundice is developing is normal or considerably below normal, falling to 96° or 95.5° F. in some cases, before other elements besides the arrest of the hepatic function enter into the morbid complexus. Although the disturbance of the cerebral functions is usually accompanied by some febrile excitement, this is not always so, and Traube asserts that the condition of delirium does not affect the temperature.

The cerebral functions are disturbed to a greater or less extent after the jaundice has appeared, as a rule. The causes of this disturbance, from the point of view of the offices of the liver in the animal economy, are extremely important and instructive. Certain initiatory symptoms may give warning of the violent disturbance to follow; the patient may be suddenly seized with delirium and become insensible. Dr. Legg insists on the importance of dilatation of the pupil as the initial phenomenon, and the occurrence of which should excite apprehension in any case of jaundice. Thierfelder says that, besides being dilated, the movements of the pupil are sluggish. Rarely, rather, the pupils are contracted. Then come on a violent headache, restlessness, insomnia, or there may be stupor, indifference, prostration. Or "palpitation of the heart, with strongly accentuated first sound, abnormal sensitiveness to light and sounds, fainting," etc., may usher in the more formidable symptoms. Or, in still other cases, without any warning, delirium of a violent kind may ensue, or insensibility come on. Sometimes, in the midst of profound coma, an access of acute delirium may be manifest. The delirium varies in severity from a momentary incoherence up to the wildest mania. The coma manifests an equal variability: it may be a slight somnolence, or such depth of insensibility that no irritation can arouse. Convulsions also appear occasionally in adults—nearly if not quite constantly in children. These also vary from twitching of a few facial muscles up to a general epileptiform seizure, or a tetanic spasm. Legg finds that in 100 cases of the genuine disease, analyzed by himself, there were in 76 coma, in 59 delirium, and in 32 convulsions—results in general conformity to the usual observations.

In these cerebral effects, every one must be attracted by the resemblance to the symptomatology of certain poisons. The extraordinary likeness of acute yellow atrophy to phorphorus poisoning, already mentioned, will be hereafter discussed. Now the question pressing for answer is—What morbid products present in the blood can produce such disturbances? Are they of hepatic origin? We have already furnished the data for a decision on some points. The probability of the existence of the *cholesteræmia* invented by Dr. Flint, and developed by him with

great ingenuity into a morbid state, must, in view of recent researches, be denied. The absorption of bile into the blood, which occurs in ordinary jaundice, is not accompanied by such symptoms. Leyden, it is true, affirms that the bile acids, which are known to act destructively on the red corpuscles when injected into the veins of dogs, do produce nervous symptoms analogous to those of acute atrophy, but he is not supported by many facts necessary to this theory. Leucin and tyrosin injected into the blood produce no symptoms. Frerichs suggests that a special poison may be produced by the disintegrating glandular substance, and that the nervous symptoms may result from its action on nervous matter. It need hardly be stated that there is absolutely no proof of the existence of such a poison; therefore, the search for a cause of hepatic origin, to account for the nervous symptoms, proves fruitless. Are the nervous phenomena due to uræmia? Although there is a general resemblance in the nervous disturbances belonging to acute yellow atrophy and to Bright's disease, respectively, when we come to the examination of particulars, wide differences are seen. Although the urine contains little or no urea, and but a small amount of albumen, and is otherwise altered in character, it has a maximum specific gravity, excretion of poisonous matters goes on, and hence the ordinary conditions producing uræmic intoxication are wanting. Rokitansky and Frerichs were much inclined to the uræmic theory, but the more recent investigations have apparently conclusively decided against it. Thierfelder sums up in a few words the main points:—

"The kidneys fail to present in most cases, either as respects their function or their anatomical condition, such derangements as are found in those affections in whose train uræmia is most constantly developed; and as regards the diminution or disappearance of the urea in the urine, it is much more probable, as will be presently shown, that the formation of this substance and not its elimination from the blood is impeded."

Traube refers the nervous symptoms, not to cholæmia, but to inanition of the brain, which H. Weber supposes to be the cause of the delirium in pneumonia, and in fevers. Not only is the brain inadequately supplied with blood, but the blood is damaged; among other ways, by the action of the bile acids on the red corpuscles, and by the imperfect preparation in the intestine of the material of nutrition. Legg, rejecting all extraneous causes except the anæmia of the brain—or inanition—finds in the changes which occur in the cerebral vessels and tissues, as described by Steiner and Wunderlich, sufficient explanation of the nervous phenomena. (p. 455.)

Authorities are agreed as to the remarkable analogy between the symptoms and morbid anatomy of acute yellow atrophy and phosphorus poisoning, and some indeed maintain their identity, as has been stated. Dr. Legg sums up with great success the points of agreement and difference.

"The temptation to look upon acute yellow atrophy as identical with phosphorus poisoning is certainly very great. The features of the two states bear the closest resemblance. Both are seen much more often in women than in men, and preserve much the same proportion; both are rare in childhood, common from puberty to about 35, and then again become rarer. The symptoms likewise are almost identical; a gastric catarrh followed by jaundice, during the course of which nervous symptoms and hemorrhages are seen, the end being in most cases fatal. The only clinical distinction which has been made, and in my opinion, not very successfully, lies in the state of the urine. Schultzen and Riess, as already stated, believe that in acute yellow atrophy, leucin and tyrosin are present in the urine; while in phosphorus poisoning these bodies are absent. Setting aside the cases

of phosphorus poisoning in which these bodies are said to have been found, but which show some uncertainty, I must own, I do not think the distinction will hold. It seems very improbable that if the same grave changes in nutrition take place in both states, such bodies as leucin and tyrosin should not be common to both. The morbid anatomy of both diseases has been warmly contested. The state of the kidneys, stomach, glands, and muscles is admitted to be identical in both; but the liver is said by some to be always enlarged in phosphorus poisoning, and to show no real fatty degeneration but a mere fatty infiltration. This again is denied to be true constantly. It is said with a good show of reason, that the size of the liver in both diseases depends on the length of time that the disease has lasted; that the liver is large if the disease end early, and small if the disease last long in both."

Such close correspondence in the action of a poison and the behaviour of a disease would indicate, that the latter is produced by an unknown poison. It remains for future investigation to determine the nature of the cause. It would, indeed, be surprising if some mysterious germs, micrococci, or bacteria had not been summoned from the regions of the unknown to make plain the origin of unexplained conditions. Klebs has, as is known to all the world, found a specific parasite for almost all diseases (Beiträge zur Kentniss der Micrococcen—*Archiv für experimentelle Pathologie und Pharmacologie*, Bandes i. ii. und iii.). Eppinger, supported by Klebs, has discovered in great numbers in the ducts of the liver the *Microsporon septicum*. It cannot be said, however, that this discovery has awakened any enthusiasm, or prepared the way for a final solution of the problem.

Dr. Legg, after concluding the subject of acute yellow atrophy, devotes a chapter to "Yellow Fever." Although in respect to symptomatology there are very obvious points of difference, yet it is almost impossible to distinguish between them in the *post-mortem* examination. He does justice to Dr. Alonzo Clark, who first pointed out the fatty degeneration of the liver, and who was followed by Dr. Bache. In the course of this chapter he differentiates between acute yellow atrophy and yellow fever, showing that some of the historical examples of the latter were probably cases of the former—a fact which indicates the close clinical correspondence of the two affections. There must, then, be a family affinity in the poison causing these diseases, and phosphorus. Beside the careful comparison at all points of phosphorus poisoning with acute yellow atrophy, Dr. Legg devotes a special chapter (the XXIVth) to the former. He shows that phosphorus has become a fashionable agent for suicidal purposes, and that "scarcely a week passes but some bodies are brought in for examination to the Pathological Institute at Berlin." The method most commonly employed in Germany, is to infuse the heads of about one hundred matches in coffee. Although the employment of this agent for suicide is not common in this country, accidents happen, with children, who may eat match heads.

But sufficient attention has been given to this department of the subject, and we, therefore, pass on to *icterus febrilis* (Chapter XXVI.)—that form of jaundice which accompanies pneumonia and certain febrile affections. Various explanations have been offered. The most satisfactory causes are two: obstruction to the bile-ducts by a plug of mucus, or by catarrhal swelling of the mucous membrane, and parenchymatous degeneration, which occurs in consequence of persistent high temperature. The jaundice which appears during the course of malarial fevers, and which Dr. Legg thinks is not frequent, is due to catarrh of the ducts and conse-

quent obstruction. He is certainly in error in regarding malarial jaundice as uncommon. He does not allude to a form of malarial jaundice which comes on without any febrile disturbance, like the cases of spontaneous ague-cake. Any one who has had experience in the malarial diseases of the Mississippi Valley, will recall examples of both; a jaundice coming on without any apparent febrile movement, and disappearing rapidly under quinia, and a splenic enlargement arising in the same way. It is, of course, known that various functional derangements occur, in place of the febrile, in acute and chronic malarial poisoning: jaundice may be the succedaneum of periodical fever. It is true, nevertheless, that the jaundice occurring in the course of malarial toxæmia may be produced by the extension to the bile-ducts of a catarrhal process in the duodenum.

In his account of *icterus neonatorum*, Dr. Legg gives the statistics of Dr. Kehrer, who had 474 cases under examination. Of these, 5.3 per cent. were jaundiced on the first day, 62.9 per cent. on the second day, 124.1 on the third day, and after that but few. In one-third of these, the jaundice was over by five days, but in the greatest number, by six to ten days. There are various explanations of the causes of this jaundice. Billard offers a satisfactory solution of the problem, for those cases, at least, of which the skin only is coloured. These, he says, are due to changes in the circulation of the skin, the fading leaving behind a yellowish tinge, like the fading of a bruise. The explanation of Frerichs seems to be satisfactory in the cases of true jaundice. It has been pointed out already that jaundice may be due to lowering of the blood-pressure in the portal system. When the umbilical cord is ligated, the blood which passed into the portal vein from the umbilical, is suddenly cut off. Although in strong infants the balance of the circulation is quickly restored, in weakly infants, the lungs not thoroughly distended, the conditions are brought about for the flow of bile into the blood, instead of into the ducts. In other cases, as Virchow has pointed out, the jaundice is catarrhal. There are, also, quickly fatal cases from congenital narrowing or deficiency of the gall-ducts.

Our author also describes an *icterus menstrualis*, in which a monthly jaundice appears, instead of the normal menstrual flow. This is so rare as to be a pathological curiosity rather. The last chapter of the work is on bilious diseases, which we have already examined. He does not consider any other diseases of the liver than those having relation to the biliary function. Congestion, inflammation, sclerosis, suppuration, amyloid disease, cancer, parasites, etc., and the diseases of the biliary passages, he is silent in regard to. He may intend to follow this with another work, in which all other topics than those he has here discussed will receive adequate treatment; but he gives no information about his future purposes. This work, on the whole, is disappointing. It is able, and exhibits both learning and industry; but there is much repetition due to an imperfect arrangement of the topics discussed, and faulty digestion and assimilation of the vast material here accumulated. Dr. Legg not only shrewdly comments on the facts and opinions of others, but he has no little original knowledge of his own to offer. It is much to be desired that he complete the subject by another volume which shall embrace the topics not included in the present work. There are many interesting and important diseases of the liver requiring elucidation, and on which, we doubt not, he would cast a brilliant illumination. Meanwhile we may supplement our running comments on these diseases of the liver involving

the biliary function, and in a future number submit some criticism of the modern opinions and practice in respect to the other hepatic diseases. Notwithstanding the rather gloomy view taken by Dr. Legg of the modern contributions to hepatic physiology and pathology, we believe that substantial progress is being made. Especially is progress making in the department of hepatic therapeutics. As the treatment of diseases can make sure advances only on sound acquisitions in physiological pathology, we may draw from the advance in hepatic therapeutics the just conclusion that our knowledge of the liver is really extending. R. B.

ART. XIV.—*The Principles and Practice of Surgery, being a Treatise on Surgical Diseases and Injuries.* By D. HAYES AGNEW, M.D., LL.D., Professor of Surgery in the Medical Department of the University of Pennsylvania. Profusely illustrated. Vol. II. 8vo. pp. 1066. Philadelphia: J. B. Lippincott & Co., 1881.

THE first volume of "Agnew's Surgery" was noticed in the number of this Journal for January, 1879, and we have now the pleasure of welcoming the second, in which the author has treated chiefly of *injuries and diseases of joints, of amputations, of injuries and diseases of the genito-urinary organs, and of affections of the spine and mouth.*

The first chapter (Chapter XI. of the complete work) is devoted to the consideration of dislocations in general and in particular. That complete luxation may, in enfeebled subjects, occur without laceration of the capsule is regarded as possible, though we are "not aware of the existence of any specimen which establishes the statement." Manipulation is recognized as an old method of reduction, systematized and its process formularized, however, only by modern surgeons.

Compound dislocations are advised to be treated antiseptically, the author here, as elsewhere, showing himself favourable to "Listerism"; and it is declared to be the "safest course to cut away the displaced ends of the articulating bones." The Astley Cooper limit of time proper for the reduction of old dislocations, it is thought, may be materially extended in these days of anæsthetics and of intelligent manipulations, the patient having been duly informed of the dangers attending the attempt at replacement, and subjected for some days to preliminary preparatory movements.

Under the head of "dislocation of the inferior maxillary bone," notice is taken of subluxation and "noisy movements," as also of "cramp of the jaw" from spasmodic contraction of the anterior belly of the digastric muscle, such spasm being "easily removed by friction with the finger over the rigid muscle". Replacement of dislocated vertebræ is directed to be made, if possible, in all cases.

Separation of the clavicle and the acromion process are denominated dislocations of the scapula, instead of the more usual "of the outer end of the clavicle;" and for the same reasons, the displacements at the ankle are described as luxations of the foot, instead of the bones of the leg. In the treatment of the various forms of clavicular and scapular luxations no mention is made of the use of plaster of Paris, which certainly best fulfils the one essential indication of securing as completely as possible the immobility of the replaced parts.

Of the scapulo-humeral dislocations the subcoracoid is regarded as the most common; and in all the varieties the author believes that "the coraco-humeral part of the capsular ligament remains untorn," and "performs an important office in conducting the head of the bone into the glenoid cavity during properly applied efforts at reposition." In treating of attempts at the reduction of old dislocations of the shoulder, reference is made to twenty-four cases of resulting injuries of the axillary vessels, fifteen terminating fatally, seven recovering, and two "not determined."

Fracture of the surgical neck of the humerus, in such attempts, is not regarded "as a calamity, but as a desirable occurrence," permitting of the establishment of a false joint. Of the cause of the peculiar deformity and great difficulty in the reduction of the backward dislocation of the thumb, the author says, "after producing the luxation on the cadaver, and then carefully dissecting the thumb, I have no doubt" that they are due, "in most cases," to the action of the two portions of insertion of the short flexor. That a backward luxation of the head of the femur may occur, it is believed necessary that the limb should be in a state of *adduction* or *internal rotation*, the posterior part of the capsule being torn, and the bone passing directly backwards.

There is, it seems to us, strong reasons for believing, with Mr. Morris, that in the large majority, if not all, of these luxations, the head primarily presses upon and lacerates the lower and inner portion of the capsule, the thigh being *abducted* and often rolled *outwards;* the ultimate location of the displaced head depending upon the duration and direction of the secondary force. The author reports having once found, upon dissection, an untorn ligamentum teres in a case of thyroid luxation. In treating of sciatic displacements no reference is made to "Allis's test," the application of which will certainly, in doubtful cases, be of great value in establishing the nature of the hip-injury. A table is given of twenty-three cases of anomalous dislocations. As respects the occurrence of partial or incomplete luxations of the hips, it is declared that "we are not at present in possession of any facts which can be considered as conclusive on the subject."

Chapter XII. on *diseases of the joints* will be found, by practitioners generally, to be as valuable certainly as any other in the work, treating as it does of cases that frequently come under care, the favourable or unfavourable termination of which largely depends upon the time at which the disease is recognized, and the nature of the treatment instituted. For the relief of the inconveniences and dangers of movable bodies within the knee-joint, removal of such by the indirect method is advised. In severe sprains warm applications have been generally found to "yield the greatest comfort." Nothing is said of the early application of the immovable dressing (though immobilization is advised in cases of so-called irritable joint), an omission which is to be regretted; for in many, if not most cases of sprain, fixation of the joint by the plaster-roller or the Bavarian splint gives almost immediate relief, and materially shortens the period of convalescence. Of course judgment must be exercised as to the time the dressing is allowed to remain, for if left on too long it will do harm by preventing motion. This latter our author advises to be made as soon as the thermometer shows no abnormal heat, without regard to the presence of either pain or swelling, a rule that obviously cannot be applied when the permanent dressing is used. Massage is merely mentioned. In joint-wounds absolute immobilization is insisted upon, aspiration being directed

if the joint becomes distended, or, if the pus has passed outside the joint, free incision. Passive synovitis is regarded as inflammatory, the absence of redness of the membrane being due to "the depleting effects of the free transudation." In bony anchylosis of the knee subcutaneous drilling and fracture of the femur is advised. Osteotomy with saw, or, better, chisel, which, by most, at present, is regarded as the more advantageous operation in these cases, is dismissed with the simple statement, that "the division of the femur might also be effected by the Adams saw."

In certain cases of joint contusion it is thought that a primary disturbance of the cartilage-nutrition takes place "before any structural alteration in other portions of the joint." As respects the vexed question of "scrofulous disease of the joints," it is said, "I am not prepared to reject altogether the old doctrine of constitutional organization predisposing to arthritis in young persons. This may be quite as appropriately expressed by strumous disease as by any other term. . . . While I do not deny the possibility of hip-joint disease being developed in a child of sound constitution, yet such an occurrence is, in my judgment, entirely exceptional." In presenting, in tabulated form, the differential diagnosis between sacro-iliac and hip-joint disease, pain is put down as "never at the knee," a statement certainly too general, for, in some cases, where the disease affects the anterior surface of the joint, pain is felt at the knee, consequent, of course, upon irritation of the obturator nerve as it passes across.

Respecting the mechanical treatment of hip- and knee-joint inflammations the following words, as the expression of the views of an experienced and cautious surgeon, deserve full consideration: "Motion without articular pressure or friction is simply impossible, and it is not in the power of man to make it otherwise. . . . I believe that the various mechanical appliances designed to combine extension with motion are, in most instances, highly prejudicial, tending to perpetuate inflammation, and to favour suppuration, and thus either to prevent resolution of the arthritis, or to delay anchylosis when that termination is inevitable. All the so-called walking-splints, which allow the weight of the patient to rest on the affected limb, not only do not, in my judgment, fulfil the indications required in the treatment of coxalgia, but are at variance with all the principles involved in the management of the inflammation." Thomas's splint, or something like it, with elevation of the sound foot, is preferred in cases of hip-disease, Hutchison's plan of simply keeping the foot on the diseased side clear of the ground not being favoured, because of the necessity, for the securing of absolute rest, that the "muscles, as well as the bones, should be in a state of quietude." When excision of the diseased hip-joint becomes apparently necessary, preliminary digital exploration is advised. In knee cases, after a due confinement to bed, when all the possible advantages have been derived therefrom, it is recommended to get the patient up on crutches, and a raised shoe on the sound foot, and let him move about as freely as he may be disposed to. When the disease has advanced to the stage when either the affected joint or the limb must be removed, "excision is always to be preferred for children, and amputation for adults."

In the succeeding chapter there are given, briefly but clearly, the general indications and contra-indications for bone and joint excisions; the rules to be observed; the various proper operative procedures; and statistical statements of their value. Special reference can be made to but a few points. Contrary to the opinion of many, the author does not believe

that partial excision of the elbow for disease is more dangerous than complete excision; he no longer employs the Esmarch bandage in these operations, and declares that the value of the subperiosteal method has been very greatly exaggerated.

In wrist-excisions he does not believe it necessary to remove the entire carpus if the disease has not extended beyond the first row. No reference is made to rib-excisions in cases of empyema. In gunshot injury of the head of the femur primary excision "will be indicated in all cases in which no other serious complication exists" necessitating amputation.

In similar injuries of the knee-joint, excision, it is declared, "should be abandoned," and in this opinion surgeons generally will coincide; except, in cases that can quickly and easily be transferred from the field to a permanent hospital where they can receive proper attention. Ankle-joint removals are evidently not favoured, the propriety of the operation being held to be "still under discussion;" and an unfavourable estimate is made of the value of partial excision of the femur, and of complete and even partial ones of the tibia—more unfavourable than will by many be deemed just, taking into consideration, the operations for ununited fracture of the former bone and for phlegmonous osteo-periostitis of the latter. "When several of the tarsal bones in front of the os calcis and astragalus are involved in disease or injury, a Chopart or Pirogoff amputation will be preferable to excision;" the correctness of this statement we are inclined to question, for the results of the few incisions that have been made have been generally very satisfactory, and we cannot but think that in the future surgeons may say of these removals of the foot, as our author says of amputation of the arm before excision of the elbow became a recognized operation: "It is sad to contemplate the number of feet that were amputated which might have been saved had the method of excision received that attention to which it was entitled."

Between this chapter on excisions and that upon the nearly related subject of amputations, are put in chapters on minor operations, upon general considerations with regard to operations, and upon anæsthetics. That upon general considerations, though from its very nature it does not permit of special review, deserves the careful attention of all readers of the work, presenting, as it does, clearly and succinctly the results of long experience and careful observation.

As respects anæsthetics, preference is decidedly expressed for ether, no man it declares having "any right to jeopardize unnecessarily the life of a fellow being. Chloroform, except in the few cases when ether fails to produce decided anæsthesia, should be banished from surgical practice." In tracheotomy for croup it is advised to withdraw the anæsthetic after the first incision through the skin has been made. There is no mention of the employment of the bromide of ethyl (the career of which was so "rockety"), of the use of the mixed anæsthetics, nor of the preliminary administration of a hypodermic injection of morphia.

Amputations receive full consideration both as respects the general indications and contraindications therefor, the time at which and ways in which the operations may and should be made, the results of the limb removals, and the special amputations in the upper and lower extremities.

In common with surgeons generally, primary operations are favoured; the advantages are recognized of both circular and flap methods according to locality; the antiseptic method is believed to materially shorten the period of healing, though it is unsettled whether or not it lessens mor-

tality. The "open method" is simply mentioned; no reference is made to Broca's way of controlling spasm, by compression of the main artery of the extremity. Post-amputation osteo-myelitis is regarded as the product of osseous concussion and rarely due to saw-violence. A table is given of seventy-four multiple primary amputations, and triple synchronous amputations are mentioned.

Reference might also have been made to what came very near being a quadruple synchronous amputation, the case reported by Act. Asst. Surg. Muller, U. S. A., in which the four extremities were removed for gangrene from frost-bite, though three days intervened between the operations on the arms and legs. Respecting special amputations certain of the author's views should be noted. Instead of formal amputation of a part of the finger for necrosis or crush of the ungual phalanx, simple removal of the bone is advised; in injuries of the hand it is directed to "perform no amputation when there is the faintest probability of saving the damaged part" (the safest general rule is to make no primary operation); amputation at the elbow or knee-joint is to be preferred to one through the humerus or femur when the character of the disease or injury permits of a choice being made.

In Hey's tarso-metatarsal amputation it is stated that the second metatarsal is "sawed off on a level with the internal and external cuneiform bones." Though this statement is in accord with that of many surgical writers, and such an operation is a proper one to be made in many cases, it is not Hey's amputation; which originally was one altogether in contiguity, and afterwards modified by the taking away of the projecting part of the internal cuneiform bone. "I then separated with the scalpel the four smaller metatarsal bones at their junction with the tarsus; which was easily effected, as the joints lie in a straight line across the foot. The projecting part of the first cuneiform bone, which supports the great toe, I was obliged to divide with a saw" ("Practical Observations in Surgery," by Wm. Hey, F.R.S., second edition, London, 1810). In removal at the knee-joint the patella is to be left; mention is made of the use of the "Davy lever" in disarticulation at the hip. In treating of this latter operation no notice is taken of the method of Verneuil or that of Lacauche, procedures by which the loss of blood can be very materially diminished.

In the paragraphs (in the succeeding chapter) on *traumatic fever* the author clearly indicates his belief in the identity of cause of the febrile affections of varying degree of intensity consequent upon traumatism, such cause being "the introduction into the blood of certain subtle septic matters which are the products of tissue-decomposition. . . . The relation which minute organisms, like bacteria, found in the blood of infected persons bear to the change in the constitution of that fluid is more matter of conjecture." In the graver septicæmic conditions drugs are declared to possess "little, if any, value as curative agents. They may seem to retard the fatal event, but never to prevent it."

One-half of the present volume is devoted to the consideration of injuries and diseases of the genito-urinary organs of the male and female. Though the importance of these affections cannot be over-estimated, and the profession will gladly welcome any contribution from Prof. Agnew's pen upon their nature and treatment, the propriety of the extended discussion at the present day in a general work on Surgery of, *e. g.*, renal diseases, or of ovarian or uterine tumours, may perhaps be questioned. As we have already done with reference to joint diseases and injuries, now we

can only take passing notice of certain points here and there that have attracted our attention because of the special importance of the advice given, the peculiar views entertained by the author, or the strength added to the one party or the other holding opposite opinions on vexed questions. Non-specific urethritis can be, it is believed, diagnosticated from that of specific origin, chiefly by the milder character of the symptoms. It would certainly be very satisfactory to every practitioner to believe that he could in all cases establish this differential diagnosis. The use of strong solutions of nitrate of silver to abort a gonorrhœa is most unqualifiedly condemned. Epididymitis is not thought due to extension of inflammation along the vas deferens, but to the sympathetic "kinship" between individual members of the same system. The radical cure of stricture is believed to be "entirely beyond the reach of surgery." Even after internal urethrotomy "the resulting cicatrix will always retain the invincible property of contraction. The tendency to coarctation in the canal is, it is true, lessened, but it is not destroyed; and hence the patient must be instructed to pass a metal sound once or twice every month if he expects to keep out of the hands of the surgeon at some future time." As is usual with surgical writers, it is positively declared that "as long as the urine can find its way out through the urethral canal, even though it is only in drops, the route to the bladder in the opposite direction is not impassable by instruments in a skilful and patient hand." This is undoubtedly true, but it is equally true that the most skilful and patient hand will at times fail to find that passable route, and from the days of Syme and Liston to the present strictures have been met with that no surgeon was ever able to get an instrument through. Divulsion is not favourably regarded, preference being expressed for treatment by dilatation, and "failing in this, incision or internal urethrotomy, followed by dilatation." In cases of senile hypertrophy recourse is to be had to the use of the catheter as soon as it is discovered that "a portion of the water remains in the bladder which cannot be displaced by the voluntary efforts of the patient." Crushing of hypertrophied masses projecting into the urethra "would be better done on the dead body, if done at all." Forced catheterization is very justly characterized as "most rash, dangerous, and culpable surgery;" and the tapping of the bladder is to be preferably done with the aspirator needle, "the simplest plan, and one requiring very little skill." No favourable opinion is entertained of washings or irrigations of the bladder in chronic cystitis, and cystotomy in the male is declared "on trial," statistics thus far not presenting a "very flattering prospect."

Varicocele, if requiring operative interference, the author prefers to treat by subcutaneous ligature, the Astley Cooper method of excising a portion of the scrotum not being favoured. For the radical cure of hydrocele, injections of the "undiluted officinal tincture of iodine should be thrown in and allowed to remain." Contrary to the belief of most surgeons, a cryptorchid is thought to be capable of begetting children. It should not be forgotten that however sound as a legal principle, it is not so as a medical one, that the husband is always the father of the child. Bigelow's litholapaxy, though mentioned and briefly described, does not seem to be very highly esteemed, or at any rate it is not advised to substitute it for the previously employed methods of crushing; indeed, if we correctly read between the lines, Prof. Agnew is not very partial to lithotrity, and would be inclined to say, as recently did a very eminent Irish surgeon, "If I had stone myself I would be cut rather than have it crushed." Of

the 29 nephrectomies tabulated (pp. 714–15), one, certainly, that of Drs. Dawson and Bartholow, was not a removal of the kidney, but of a renal calculus which had caused a perinephritic abscess.

Vaginismus, it is believed, only very rarely necessitates the use of the knife, dilatation under anæsthesia securing the desired result in the great majority of cases. Battey's operation "in cases in which there are structural changes in the ovaries or the uterus, constituting the exciting cause of persistent suffering, and undermining the health physically and psychically, and for the relief of which all the usual remedies at command have been exhausted," is declared to deserve the "unqualified sanction of the profession." An elaborate table of 107 of such oöphorectomies is given, with a general summary thereof; as also in its proper place an analytical table of 5153 ovariotomies.

Chapter XXII. is devoted to the *surgical diseases and injuries of the spinal region*. "Spinal concussion," pure and simple, is regarded as an infrequent accident, if indeed it has any existence; and the effects ordinarily attributed to its occurrence are thought to be due rather to compression of the cord or injury of parts of the nervous apparatus outside the spinal canal. No more faith is had in the "railroad spine" as a peculiar form of trouble; "it is not clear that there is anything peculiarly distinctive or original in the concussions received by persons who encounter injuries from the collision of railroad trains moving at a high rate of speed." In the earlier stages of lateral curvature mechanical treatment is declared to be both unphilosophical and injurious, since it keeps in a state of rest the muscles "on which our hopes of improvement or of cure concentrate," the result being that they "waste, and become more and more disqualified to support the body." When, however, "the structural alterations have so far advanced that all attempts to correct the distortions must necessarily prove utterly useless," the deformities demand the application of some form of jacket, plaster, leather, or steel. In posterior angular curvature it is believed that "in a large majority of cases the vertebræ are first affected, and the cartilages subsequently disintegrate from the destructive effects of the contiguous inflammation." As respects the vexed question of the traumatic or constitutional origin of Pott's disease, the author declares that, as far as he is capable of judging, "the disease commences by an infiltration or a disseminated formation of strumous or tubercular matter in the cancellated tissue of one or more vertebræ, . . . some depreciation in the health, or some injury (and here is where traumatism comes in) kindling into activity the inflammatory processes or osteitis." The importance of rest in the treatment of this disease is strongly insisted upon; such absolute rest being maintained, when the cervical or cervico-dorsal region is affected, until anchylosis is established, as "no apparatus ever devised by the ingenuity of man can sufficiently relieve the spine from the weight of the head to render the erect position safe."

The final chapter of the volume is upon the *Surgical Diseases of the Mouth*. In hare-lip early operation is advised; in the simple variety, when the child is in good health, "at any time after the second week," and in complicated cases after "four or five months." Tongue-tie is said to consist in a preternatural shortening of the frænum; really it depends upon a too-long frænum attached too far forward toward the tip of the tongue.

Respecting the chief cause of dental caries, so common in our country,

the author regards it as "not extremes of temperature, carelessness with regard to cleanliness, the use of sweets, etc., . . . but one as general as the system at large, . . . the product of all those agencies which go to make up the structure of modern social life, including eating, drinking, sleeping, exercise, and education." In cases of parenchymatous tonsillitis, next in importance after the local abstraction of blood, is placed the internal and local use of guaiacum; "the value of this remedy admits of no question." In writing of the excision of the chronically hypertrophied tonsil it is declared that the operation was "alternately revived and condemned until 1740, when Richard Wiseman, among English surgeons, popularized" it. The date is evidently misprinted. The use of Monsel's solution of iron is advised for the arrest of troublesome hemorrhage following such excision; a styptic that may perhaps be advantageously employed by an experienced surgeon, but which, in ordinary hands, is very apt to do great harm, failing to stop the flow of blood, and causing the formation of a large, soft clot, filling up the mouth. Ranula is stated to be a retention cyst arising from the obstruction of the duct of either the submaxillary, sublingual, or Rivini's glands, Fleischman's bursa Prof. Agnew never having been able to discover. That the parotid gland can be and has been completely removed is accepted as a settled fact; "there are not less than one hundred and eight cases recorded in which the evidence of the entire gland having been removed scarcely admits of a doubt." Caries of the cervical vertebræ is declared to be "much the most fruitful source" of retro-pharyngeal abscess; by many it is believed that such abscess is, in very young subjects at least, usually consequent upon adenitis and periadenitis. Pharyngeal stenosis is said not to be benefited "either by incision or by dilatation. . . . If the necessity for an operation should arise, the excision of a piece from the pillars of the fauces will be preferable to making a dilatation." In cicatrical stricture of the œsophagus, however, "the use of bougies finds its proper application;" such instruments being passed, as a rule, not oftener than "once in four or five days." In treating of foreign bodies in the œsophagus attention is called to the fact that "when the body is so large as to press strongly against the posterior wall of the trachea, the sense of suffocation is so urgent that the patient becomes greatly agitated, and instinctively throws the head back. . . . I believe this is the only accident in which the instinctive efforts of the body tend to destruction, throwing back the head increasing the danger instead of lessening it, by stretching the trachea more forcibly over the impacted body." Of Hamburger's œsophageal auscultation, the result in the writer's experience "has been negative." In considering the means by which the tube may be recognized in œsophagotomy, notice is taken of its "alternate distension and collapse in the acts of inspiration and expiration." When an artificial introduction of fluids into the stomach becomes necessary, it is advised to carry the tube through the nose rather than the mouth; and for removing the contents of the stomach in cases of poisoning, a stomach-pump is said to be required. When such instrument is not to be had, the stomach can be thoroughly emptied through an introduced tube, by simply depressing the head and shoulders.

The work under review may truly be said to be "profusely illustrated," for there are in this volume about eight hundred cuts. Many of them, we cannot but think, might as well have been omitted, some of them being old friends and others belonging simply to the instrument-maker's catalogue.

A third volume is yet to appear, and when it is published the profession of our country will have another native "Treatise on Surgery" of which it may well be proud. With "Gross" and "Agnew" as encyclopædic works, and "Ashhurst" and "Hamilton" as digests, practitioners ought not to be at a loss to know what to do and how to do it, in surgical cases. Will not some one write the ideal text-book for undergraduates?

P. S. C.

ART. XV.—*Clinical Lectures on the Diseases of Old Age.* By J. M. CHARCOT, M.D., Professor in the Faculty of Medicine of Paris, etc. Translated by LEIGH H. HUNT, B.Sc., M.D., Laboratory Instructor in Pathology in the Medical Department of the University of New York. *With additional lectures* by ALFRED L. LOOMIS, M.D., Professor of Pathology in the Medical Department of the University of the City of New York, etc. 8vo. pp. 280. New York: William Wood & Company, 1881.

THIS work is made up of an introduction and twenty-one lectures by Prof. Charcot and ten by Prof. Loomis. The introduction and three last lectures of Prof. Charcot's series were delivered at the Salpêtrière in 1867. The date of the delivery of the others is not given.

Prof. Charcot's introduction on "Empirical and Scientific Medicine—a Comparison between the Ancients and Moderns," is a somewhat florid discourse, not remarkable for its perspicacity. As a specimen of its manner and style, we offer the following:—

"On this side you see that *pathologico-histological anatomy* touches on pathogenesis, or rather mingles with it, and at the same time also allies itself to physiology, which in this special direction takes the name of pathological physiology.

"Now, gentlemen, it is important to notice—for it is a characteristic feature—that the end which pathological anatomy proposes to itself cannot be reached without establishing an incessant approximation of the lesion that is studied even to the minutest details of its development, and the pathological circumstances minutely observed at the bedside. And in this manner, as a consequent obligation, as a logical necessity, pathological anatomy, in proportion as it penetrates more deeply into the intimacy of tissues, becomes simultaneously more animated and living, tending toward a closer union with the clinical."

The first and second lectures are on the general characteristics of senile pathology and the febrile state in the aged. Eight lectures are devoted to a consideration of gout and as many to rheumatism, neither of which is commonly classed among the diseases peculiar to old age. The three lectures presented last in the series by Prof. Charcot, are on the clinical importance of thermometry in old age. Prof. Charcot occupies 193 pages, and Prof. Loomis 73 pages of the volume.

Professor Charcot shows, in his lecturers on gout and rheumatism, that he possesses an extensive and familiar acquaintance with medical literature, and is pleased to cite authority for many of the facts and opinions which he states. He names or refers to very many of the famous medical authors ancient and modern, Greek, Latin, German, French, Dutch, Italian, English, and so presents in a summary way an outline history of gout and rheumatism from the earliest records. He mentions 287 authors,

several of them six and eight times and one thirty-three: he cites them in support of his accuracy.

The style of these lectures is in some degree sketchy and desultory. The following paragraphs are presented as a fair illustration of it. Speaking of the etiology of articular rheumatism he says, p. 149 :—

"A *medical geography* has yet to be written. Under the influence of certain preconceived ideas a deplorable confusion has arisen among all the diseases which trace their origin to cold; and it is easily understood how difficult becomes the task of criticism when observations made in remote regions are to be examined and tested.

"It seems to be established, however, that acute articular rheumatism is a disease that abides more especially in temperate climates; it is unknown in the immediate vicinity of the poles and the equator. But this disease is quite frequently met with in hot countries; it often occurs in Egypt, according to Pruner-Bey, and in the East Indies, according to Webb; in the latter country it is frequently complicated by an endo-pericarditis.

"At the Cape of Good Hope, the geranium's native home, the number of cases of rheumatism in one thousand sick in the English army, was *fifty-seven;* while in the rigorous climate of Nova Scotia there were only twenty suffering from rheumatism in the same number of patients.

"Concerning chronic articular rheumatism, we possess no positive information, although it is at least certain that it prevails in temperate climes; in England, Ireland, France, Germany, and all Central Europe. But it may also occur in hot countries. In India, Malcolmson has found it among the Sepoys; and I myself have observed that it is a frequent disease in Naples."

All the assertions made in these paragraphs are not precisely correct, taken in their general sense; but our space does not permit us to offer a criticism in detail. We may ask, however, which of the more than threescore species of geranium—an almost cosmopolitan genus—is indigenous to the Cape of Good Hope? The relevance of "the geranium's native home" to rheumatism might not be quite clear, even if our question was definitely answered.

Prof. Charcot's lectures are interesting and, in a general sense, instructive. The translation seems to have been fairly and conscientiously made.

The lectures of Prof. Loomis are germane to the title of the book. He is clear, concise, definite in style, and, refraining from mentioning medical writers, he alone becomes responsible for what he says, and in effect is more authoritative than Prof. Charcot backed by a display of learning. The lectures of Prof. Loomis bear internal evidence that he is in all respects thoroughly qualified, both by learning and experience, to execute the work he has undertaken in a masterly manner. The reader is confident that his teaching is reliable; and that a complete treatise on the diseases incident to old age from his pen would be favourably received by the medical public.

The volume is well manufactured and, as a whole, may be recommended as a praiseworthy addition to current medical literature. A notable feature of these thirty-one "clinical lectures" is that no case of any kind is mentioned or referred to as present, in sight of the lecturers and their auditors. W. S. W. R.

ART. XVI.—*Report on Trichinæ and Trichinosis.* Prepared under direction of the Supervising Surgeon-General. By W. G. W. GLAZIER, M.D., Assistant Surgeon Marine-Hospital Service. 8vo. pp. 212. Washington, 1881.

THIS report, prepared under the direction of the Surgeon-General of the U. S. Marine Hospital-Service, is a complete synopsis of the literature and history of the parasitic worm trichina, and the affection trichinosis occasioned by its presence. The work is rendered more thorough from its including a notice of all that has been learned of the subjects in our own country. The account strikes us with wonder at the view it gives of the great acquisition of knowledge of a parasite and attendant disease which have probably affected our race from remote time, but whose existence even was not suspected fifty years ago. The parasite was first clearly recognized by Sir James Paget in 1834, and it was described and named the following year by Prof. Owen. Even as late as 1858, in *Wood's Practice of Medicine*, it is remarked in reference to trichinæ, "No evidence has yet been produced of any morbid influence exerted by them upon the system during life. They have been found in subjects carried off by sudden death, in the midst of health. Since then there has been abundance of evidence to show that "*trichina spiralis* is the most dangerous of all parasites" (Aitken, *Prac. Med.*). "Man's most dangerous enemy" (Kratz). See Report, p. 14. J. L.

ART. XVII.—*Leçons de Clinique Ophthalmologique.* Par le Dr. CH. ABADIE. Recueilles par le Dr. Parenteau. Pp. 280. Paris: O. Doin, 1881.

Clinical Lectures on Ophthalmology. By Dr. CH. ABADIE.

OF the younger Parisian ophthalmologists, none stands in higher esteem than Dr. Abadie. We remember that a few years ago, when he established his clinic *au troisième* in one of the by-streets in the Latin quarter, his *conferences* were always well attended. His service was not so large as that of half a dozen other oculists, and the rooms were small. But everything was neat and orderly, and the young surgeon was affable and, more than all, had that inborn faculty of seizing the salient points of his cases, and presenting them as a series of pictures before his hearers, which is so essential to the successful clinical lecturer.

We are glad that he has been induced to have recorded some of these lectures for the benefit of those who have not had the pleasure of hearing them. In the volume before us we find twenty-one lectures, touching upon the most varied topics in the range of clinical ophthalmology, and yet not one of which is without its special interest, in that it involves some question which is still *sub judice*. Dr. Abadie, in treating of such subjects, has given the opinions of others, with which a wide acquaintance with the literature has made him familiar, and, in addition, has offered his own views, based on original investigation or clinical experience, supported in all instances by cases, which are given in detail.

In the treatment of *ulcer of the cornea with hypopyon*, he places most

confidence in the process of Prof. Sämisch. While inclining to the opinion of an infectious origin of this serpiginous ulcer, the purely antiseptic treatment, or even the treatment by touching the ulcer with the actual cautery, he considers not sufficient. In those cases where these means have appeared to suffice, he is of the opinion that they were not cases of genuine serpiginous ulcer, but rather chronic ulcers without hypopyon. Where we have to do with the true serpent ulcer, as described by Mooren, Steinheim, and Sämisch, in which an ulcer, with grayish or yellowish borders commencing at the edge of the cornea, travels slowly over the surface and is accompanied by excessive pain, an incision through its base and into the clear portion of the corneal tissue, so as to allow an exit to the aqueous humour and the pus in the anterior chamber, offers us the only certain hope of relieving this rather rare but extremely dangerous affection.

In the treatment of *purulent ophthalmia*, he comes back to cauterization with strong solutions of nitrate of silver. Recently there has been quite a backward swing of the pendulum in regard to the therapeusis of this common and highly dangerous disease. There are even practitioners who discard caustics altogether, and rely wholly on cleanliness and some form of antiseptic dressing. That they can show a very fair percentage of good results, Dr. Abadie admits; but this he accounts for by supposing that their cases have not been of the malignant type. He considers that there are two forms of this affection—one much more intensely grave than the other, the characteristics of which are a pronounced swelling of the lids, appearing on the first day of the disease, having an erysipelatous redness, a rapidly occurring chemosis around the cornea, which early becomes involved, and excessive pain. He attaches but little importance to the abundance of the purulent discharge. In *all* cases, of whatever form, he uses cauterization of the everted lids with solutions of three to five per cent. of argt. nit. once in twenty-four hours, decreasing the strength of the solution as the symptoms abate to one or even one-half per cent. At the same time he has ice compresses applied continuously day and night, until the force of the inflammation is broken, when they are to be continued at intervals of a few hours. When the cornea is involved he uses a solution of eserine (0.05 centigr. to 10 gram. of water) three times a day.

In treating *granular conjunctivitis*, he uses a solution of liq. plumb. subacetat. (15 gram. to 15 gram. water, applied to the inside of the lids by means of a camel's hair pencil). He says nothing of the let-alone treatment, which is, I believe, American in its origin. We have ourselves long been of the opinion that true trachoma is but the local expression of a peculiar diathesis, the nature of which is not fully understood. It is not enough to say that it is a disease resulting from contagion and bad hygienic surroundings. We do not presume to deny their importance as causative agents, but that they are alone insufficient for the production of the disease is amply demonstrated by the fact that the negroes in America, even when their hygienic surroundings are of the worst, enjoy a comparative immunity from the disease. The influence of race and nationality we believe to be very great. The Irish are the largest sufferers; next come, perhaps, the Germans and French, though the English and Americans are by no means free from the disease. This being the case, no mere local treatment can *cure* a genuine trachoma. We are inclined to the opinion of Sichel, *fils*, who regards the trachomatous deposit as analogous to the tubercular, in so far as its tendency is to

destruction of the tissue in which it is imbedded. It has its regular process of evolution and degeneration, and in the large majority of cases no local applications can affect its progress. The effects of topical measures are felt wholly on the accompanying conjunctivitis. In the *pannus*, which is so often an accompaniment of this affection, he speaks highly of inoculation of the eye with purulent matter. Timid practitioners will no doubt shrink from such heroic measures, and will rather resort to *peritomy*, which is so highly spoken of by Wecker, Critchett, Bowman, and others. But of the brilliant success of inoculation when applied to suitable cases, there can be no doubt.

In commenting upon *optic neuritis accompanying cerebral tumours*, a full exposition is made of the various theories regarding the connections between the two morbid processes. He finds, as does almost every one who has studied its subject, that no one of the explanations is sufficient to account for all the facts. He gives, *in extenso*, the more recent theory of Parinaud, who thinks that the œdema of the optic nerve is but a part of the general œdema of the encephalic substance.

Atrophy of the optic nerve he divides into two forms, which are generally recognized as having distinct origins; these are the *interstitial* and the *parenchymatous*. In the former of these the morbid process has its seat in the connective tissue surrounding the optic nerve fibres, and the atrophy results from the compression made on the fibres by the cicatricial contraction following the inflammation. In the latter, the primary disorganization affects the nerve fibres themselves.

In making an *a posteriori* diagnosis, Dr. Abadie falls into an error, which is surprising in one who is generally so exact. In speaking of the appearance of the vessels on the disk, as observed in the two forms, he says they are *narrow* in the parenchymatous form, and *better filled* in the interstitial variety. Leber, in his classical treatise[1] on the diseases of the retina and optic nerves, states the very opposite to be the case. It is only after the progressive atrophy has existed for a very long time, that a slight contraction of the vessels is to be observed. During the passage from the state of inflammation to that of atrophy in the interstitial form, the veins are of course enlarged and tortuous; but the arteries are always reduced in calibre. "Ultimately," says Leber, "the arteries and veins are found to be extremely contracted in their diameter, becoming mere threads, and can be followed but a short distance into the retinal surface" (l. c., p. 858). We can readily understand that this must be the case. In the parenchymatous form, there is simply a wasting of the nerve substance, and no pressure is brought to bear on the vessels that would affect their calibre, whereas, in the interstitial form, the cicatricial contraction exerts a compression not only on the nerve-fibres, but also on the central artery and vein, which must lead in time to greater or less reduction of their calibre.

In a certain form of *parenchymatous keratitis*, in which there is no history of congenital syphilis, and the teeth do not present the characteristic notches of Hutchinson, he discerns the manifestation of a general morbid condition, which demands a most energetic constitutional treatment. The commencement of this form is abrupt, and its progress very rapid. In the course of four or five days the opacities have covered the whole surface of the cornea, and have penetrated to a considerable depth into its substance; there is intense photophobia and lachrymation. The opacities form, in his

[1] Handbuch d. gesammt. Augenheilk. B. V. p. 582 et seq.

opinion, a true sclerotic degeneration of the corneal tissue, while in the ordinary form found in congenital syphilis, the substance of the cornea does not, as a rule, undergo any degenerative charge. In such cases he gives the iodide of potassium in the largest doses, from 3 to 6 or 8 grammes a day, together with quinia and iron.

The lecture on *eye troubles in hysteria* is very interesting and instructive. The French still seem to lead the van in the metallo-therapeutics of hysteric conditions, and Dr. Abadie believes strongly in its efficacy in certain cases of hysteric amaurosis. Several cases are given in which undoubtedly great and immediate improvement followed the application of metals (gold, zinc, or copper) to the temples. As was pointed out by Charcot, hysteric amblyopia is always associated with a hemi-anæsthetic condition. Dr. A. calls attention to the fact that the hysteric form of amblyopia is often found in persons in apparent good health, about whom no suspicion of hysteria ever existed. Nevertheless, a rigid examination will show a diminution of cutaneous sensibility on the affected side, as compared with the other, and what is still more curious when the metals are applied to the affected side, the anæsthetic condition and the amblyopia are in some cases transferred to the other. The same is to be said of the colour-blindness which accompanies the affection. The appearance of the polyopia monocularis which is sometimes found in this form of eye trouble, Dr. A. accounts for by accepting the theory of Parinaud that it depends on an irregular contraction of the ciliary muscle. This we would hardly deem a satisfactory solution of the phenomenon. We can understand an irregular contraction of the muscle of accommodation causing an unequal curvature of the different *meridians* of the lens, but cannot conceive how, from the nature of the accommodative mechanism, it could cause an unequal refraction in its individual *sectors*. He relates one case in which brilliant results were obtained by the use of *static electricity*. The patient was placed on an insulated stool and put in connection with one of the conductors of a static machine. As soon as she was sufficiently charged, the electricity was drawn from her by passing the finger over the brow. Every discharge of electricity caused severe pain, but at the end of a quarter of an hour, vision had materially improved. After a number of *séances*, V. was brought up to 1. The author expresses the opinion that some of the cases of so-called anæmia of the retina, whose clinical history bears a strong resemblance to that of hysteric amblyopia, are but examples of the latter disease. The relief afforded by an iridectomy he considers due, not to its influence on the calibre of the vessels, but to the strong impression which the operation makes on the nervous system.

Those lectures which are of most interest to the specialists we will pass over briefly, referring the reader to the book itself for full details. The questions of glaucoma and its treatment are discussed in the several different lectures on *glaucoma*, *sclerotomy*, and *the nutrition of the eye*. The conclusions to which he arrives are similar to those brought forward by the reviewer in an analysis of a number of papers on the subject in the number of this Journal for April, 1879, and that is, that there is some truth in all the views presented, but that no one theory can satisfactorily account for all cases, nor can one plan of treatment be adopted in all forms. With our present knowledge and from most recent observations, it would seem that sclerotomy is best adapted for cases of simple chronic glaucoma where the anterior chamber is not shallow, and in cases of hydrophthalmus. On the contrary, in cases of acute glaucoma, where the anterior chamber is almost

or quite obliterated, iridectomy still remains the sheet anchor. The chapters on *optico-ciliary neurotomy, foreign bodies in the eye, iridotomy*, and *capsulotomy*, though offering nothing specially new, will amply repay perusal. In closing the volume we can only wish that some other authors possessed Dr. Abadie's entertaining manner of dealing with what are ordinarily considered dry subjects. S. M. B.

ART. XVIII.—*Transactions of State Medical Societies.*

1. *Transactions of the Rhode Island Medical Society.* Vol. II., part iv. 8vo. pp. 223–318. 1880.
2. *Proceedings of the Connecticut Medical Society*, 1881. *Nineteenth Annual Convention, held at Hartford*, May 25th and 26th. New Series, vol. ii. No. 2, Hartford, Conn. 8vo. pp. 246. 1881.
3. *Transactions of the Thirteenth Annual Meetings of the Illinois State Medical Society, held at Belleville*, May 18, 19, 20, 1880. 8vo. pp. 228. Chicago.

THE present issue of the *Rhode Island* Transactions, being part four of volume two of the series, contains the reports of three quarterly meetings, and of the sixty-ninth annual meeting, which was held in Providence, June 9, 1880.

In the Presidential address Dr. Edward T. Caswell, discussing public health, and the care of it by the State, considers the importance of properly constituted and duly authorized State Boards of Health, to the community at large. In conclusion, he reviewed the institution and progress of the National Board of Health, referring in the warmest terms of approbation to its diligence and efficiency, claiming for its work the fullest appreciation, and asking for it the cordial support, especially of physicians, in all parts of the country. He says—

"I think we are in possession of enough facts to warrant us in according all praise to the efforts of the National Board, and in rendering a cordial support to their measures. The spread of yellow fever, with our present increased means of transit, ceases to become a merely local matter. A few hours, or at the most, days may pass the bearer of contagion from Southern ports to almost any point of the more populous region of our country, and hence it becomes a matter of national importance to summarily arrest the progress of the disease. The interests of one are the interests of all, and in no way, I think, can these be so certainly secured and guarded, as by giving the fullest powers and all the necessary resources to a Board, such as the present National Board has shown itself to be."

A Case of removal of both Ovaries by Abdominal Section, for the relief of an exhausting Menorrhagia and Uterine Fibroid, with remarks by Anita E. Tyng, M.D., was reported by the operator. The patient, a lady leading the sedentary life of a school teacher, was troubled with menorrhagia and slight dysmenorrhœa. Subsequently a sub-peritoneal fibroid was discovered which increased while under observation from 1870 to 1880 when the operation of oöphorectomy was finally performed. Hæmorrhoids had also existed, which were removed at a previous operation with great relief to the dorso-lumbar pains from which the patient greatly complained. At the time of operation the patient was forty years of age. The details of the final operation were very carefully conducted under the carbolized

spray, the patient being under the influence of ether. At the end of three weeks the patient was sitting up. At the first monthly period there was a slight show and headache for a few hours, both of which recurred every day for a week. The second period was accompanied by tympanites and pelvic distress, but there was no flowing. (The subsequent report of the case may be found in the *American Journal of the Medical Sciences* for January, 1881, page 188.)

Dr. W. O. Brown, of Providence, contributes a paper entitled *Atmospheric Influences upon the Animal System*, which contains the following conclusions:—

"Carefully conducted experiments have proved that, when pressure upon the air we breathe is largely increased, characteristic and definite changes are produced in the blood and upon the muscular and nervous symptoms; that this condensation may be carried to the extent of producing cutaneous eruptions, deafness, paralysis, and even death, especially upon its sudden removal.

"Through observations made under the supervision of Dr. S. Weir Mitchell and by others upon the human system, in relation to this subject, it has been demonstrated that changes in the weather, commonly, if not constantly, influence neuralgic paroxysms in some, probably in most, of their protean forms, and that there is abundant reason to suppose that the same influence is extended to a large class of other diseases.

"Ozone, which is or was at a very recent period believed to be a principal agent in the production or prevention of disease, is now proved to be nearly or quite inoperative, being usually absent from the air of cities, and in the country so diluted as to be essentially inert.

"Barometric changes are known to have sensible influence upon pain, but they are so associated with humidity and temperature as to make it difficult to estimate their separate or specific agencies.

"Electricity and galvanism evidently exert powerful, but hitherto undefined, influence upon the animal economy, and should be principal elements of study in estimating weather effects upon pain or health.

"By the use of oxygen and other gases, it may be quite possible to form an artificial atmosphere which shall be serviceable in the treatment of disease. A large class of diseases, characterized by deficient respiration, it is proved can be benefited in this manner."

At the same meeting Dr. Geo. W. Porter read a paper on *Battey's Operation*, claiming for it a legitimate sphere in otherwise hopeless hystero-neuroses, in inveterate dysmenorrhœa, and especially in uterine fibroma. The author acknowledges, however, that the necessity for its performance only rarely occurs. He prefers the abdominal incision.

An interesting case of *Thrombosis of the Middle Cerebral Artery* is communicated by Dr. Oliver C. Wiggin, with the post-mortem examination. The autopsy showed the congenital absence of the right auriculo-ventricular septum, the tricuspid valve lying smoothly against the ventricular wall. No other sign of heart disease was present, although the left ventricle may have been a little hypertrophied. There were evidences of slight meningeal inflammation, and the occluded vessel was the seat of degenerative or hyperplastic disease of the basement membrane; a large portion of the hemisphere supplied by the middle cerebral artery was in a condition of acute softening, which occurred in the short time, sixty-five hours, that the patient survived the occlusion. "The red, softened, and corrugated state of the lining membrane of the occluded vessels no doubt took place after the accident." The granular protuberances, on the contrary, although identical with those occurring in inflammation of the arteries, were not regarded as factors of causation of the thrombosis.

A short note upon an endemic of intermittent fever that occurred at Drownville, R. I., August, 1880, was contributed by Dr. Stephen S. Keene, who records it as the first time that endemic intermittent fever has been observed in Rhode Island.

Dr. George Capron made some extended remarks upon the use of the obstetric forceps, in which, while urging caution in regard to their unnecessary employment, especially in the high operation, proper appreciation is shown of the great advantages offered by the instrument, obviating as it does very frequently the necessity of craniotomy, and saving the life of the child. Lingering labour *per se* is not considered as sufficient excuse for the resort to the forceps; but difficult labour from various causes, especially when the head becomes impacted in the middle of the canal, urgently demands intelligent interference, and the skilful application of the forceps. Where the interests of the mother or child are not endangered, delay is advisable; and in case of convulsions the induction of premature labour by forcible dilatation and forceps delivery is deprecated and condemned.

The obituary notices read were those of Drs. Samuel Mowry, Jas. T. Buttrick, Wm. W. B. Greene, Elisha F. Lamphear, and Richard S. Satterlee. A very good heliotype photograph of Dr. Mowry is also contained in this issue of the *Transactions*, and adds to its value.

2. Among the reports of special committees of the *Connecticut* Society that on *Medical Expert Testimony* considers a very important topic. While conceding to the accused in every case the right to a fair hearing, which may include the calling of expert witnesses in the defence, for the purpose of preventing unwarrantable deductions from the scientific testimony offered for the prosecution, at the same time experts are cautioned to confine their statements to questions of ascertained facts, and to avoid the temptation of giving personal opinions or interpretations as scientific truth. The expert especially deserves condemnation when he allows himself to become the advocate of a party: "the expert is supposed to have no client even though called by a party; but is expected to state only what are undoubted facts, or reliable and generally received deductions."

The report of the committee on the subject of *Lunacy Commissions, in the United States and Foreign Countries, their Histories, Aims, and Results*," in majority and minority reports, contains much information upon the subject, and both speak approvingly of supervision by proper authorities of insane asylums in order that efficiency may be recognized and extended, and inefficiency and abuses discovered and restricted.

In the report on Matters of Professional Interest in the State some interesting short papers are communicated, among which we notice cases of *Hiccough arrested by Quinine* (in a malarial subject), and of *Pyonephrosis, with recovery after Aspiration*, both by Dr. J. W. Lyons. There are also contributions on *Lacerations of the Cervix*, by Dr. Geo. C. Jarvis; *Tuberculosis of the Mouth and Pharynx*, by Dr. C. W. Chamberlain; and the *Etiology of Intermittent Fever in the Lower Valley of the Connecticut*, by Dr. R. W. Griswold. Dr. R. W. Bunn describes an outbreak of dysentery following the use of impure ice, and Dr. A. Peck gives an admirable summary of the *Treatment of Typhoid Fever*.

Dr. E. C. Seguin, of New York, delivered before the Society a dissertation upon the *Importance of the Early Recognition of Epilepsy*, "in which a number of cases are quoted in illustration of the neglect by physicians to recognize epilepsy in its early and most curable stage. *Petit mal* is often

ignored for years, and is usually looked upon as a trivial affection." While apparently of less importance than convulsions, the converse is really true. The importance of early treatment is insisted upon before the habit of convulsions is acquired, or the so-called epileptic centre (?) established in the brain. The subject of treatment is only incidentally considered in this paper, which is devoted mainly to diagnosis. The important distinction existing between eclamptic attacks and true epilepsy is insisted upon, and attention is called to the error of admitting beyond the true infantile age (3 to 4 years) a marked liability to symptomatic or eclamptic convulsions. Conceding that the symptoms of eclampsia and epilepsy are similar if not identical—"the same symptom-group occurring under different conditions"—the following summary of the diagnostic points is given:—

1. After the third year such attacks are very probably epileptic. The possibility of uremia and of syphilis should be borne in mind and a careful investigation made as to their existence.
2. Under the third year the attack may be eclamptic, probably is, but its causes should be carefully judged.
3. In many cases under three years it is well to give a moderate amount of bromide of potassium (or sodium) with regularity for several months after a convulsion; that is to say, in such cases as do not present an evident, indisputable pathological condition sufficient to cause eclampsia.
4. In all cases above three years the bromide treatment should be at once instituted and kept up for many months.

An interesting and timely essay on *Sympathetic Ophthalmia* is furnished by Dr. S. B. St. John, dwelling particularly upon the importance of early recognition of this serious affection, especially when associated with a traumatic cause, and advocating optico-ciliary neurotomy of the offending eye in preference to enucleation, wherever practicable.

Dr. Fleischner, of New Haven, in a paper on *Non-Pharmacological Therapeutics*, in which he especially considers the applications and the utility of water in the form of the bath or wet pack in a number of disorders, makes a very strong plea for hydropathic treatment of fevers, more especially those having a wide thermometric range. Not only in the eruptive fevers, like scarlatina, but also in inflammatory processes in the thorax, or abdominal, and especially the pelvic organs, is this form of treatment of great service. A caution is given against the too frequent use of the hot vaginal douche as tending to produce subsequent relaxation of tissues; for sudden emergencies such as hemorrhage, the value of hot water injections is acknowledged, but for chronic conditions, as in passive discharges, cold applications are more curative.

In an essay containing the notes of thirteen cases operated upon by Dr. Matthew D. Mann, entitled *Clinical Observations on the Treatment of Laceration of the Cervix Uteri by Operation*, the proceeding of Emmet is warmly endorsed, as a discovery which, with Sims's operation, marks an era in gynæcology. The reporter found about one case out of three of chronic uterine disease was suffering from this form of laceration, and as a rule admitted of permanent relief, only by denudation and suture. In more than thirty operations he had never seen a single bad result attributable directly to the operation.

From a consideration of *Milk; its Nature, its Contamination, and as a Vehicle of Contagion*, Dr. M. M. Johnson draws the practical deductions that milk may contain the germs of a disease from which the animal producing it is suffering, and may communicate this disease to persons consuming the milk (especially tuberculous disease). Also that one cow's

milk is more dangerous for the feeding of infants than the mixed milk of the dairy. Furthermore, that contagious diseases (typhoid, scarlatina, diphtheria) are frequently transmitted to families by milk. "When a contagious disease is taken into the system by ingestion, it causes an irritation of the alimentary canal, resulting in vomiting and diarrhœa, and the period of incubation is greatly shortened."

The foregoing paper is well supplemented by one by Noah Cressy, M.D., read at the same meeting, on the *Transmission of Bovine Tuberculosis from Infected Milk*, in which the actual and present danger to the community from this source is earnestly insisted upon and State aid invoked to prevent the sale of milk from tuberculous cows.

In an essay on *Laceration of the Female Perineum*, Dr. W. C. Burke, Jr., very ably and forcibly discusses the means of obviating this accident by relaxing the perineum, compelling the head to hug the pubic arch, and seeking to disengage the head in the interval between pains; so-called supporting the perineum is unsparingly condemned. Immediate, or the primary operation is recommended, coaptating the parts as closely as possible; being sure to pass the sutures deep enough to restore the perineal body, and not the integument and superficial structures alone.

Some obituary notices of deceased associates, and the usual lists of members close this more than usually interesting report of this relatively venerable Society.

3. One of the events of the thirteenth annual meeting of the *Illinois* Society, which deserves a special note, was the severing by Prof. N. S. Davis of his official relation in the Society as its Permanent Secretary, a position held by him continuously for nearly thirty years, with great advantage to the Society. His reason for this step was failing health.

The President's Annual Address, by E. Ingals, M.D., of Chicago, was especially devoted to the consideration of the duties of the government and the medical profession in regard to exciting public interest in sanitary questions. The disposal of sewage, especially as the problem is presented in Chicago, and the importance of good ventilation, were particularly deemed worthy of discussion in the deliberations of the society.

The proceedings of the session were largely in the form of reports upon special subjects made in accordance with appointment at the previous meeting; of which there were eight presented; the volunteer papers were only six in number.

In the *Report on Practical Medicine*, Dr. W. S. Caldwell advocates the wet-sheet and quinia in pneumonia, with alcohol, digitalis, and opium; and the treatment of diphtheria by quinia, tincture of the chloride of iron, and alcohol; with local applications (of tannin (℥ij) alcohol (℥ij) and water (℥j), or powdered alum freely applied). When laryngeal symptoms manifest themselves, he recommends inhalations of spray of carbolic acid and lime-water. In this article are cases that appear to demonstrate conclusively the contagious character of diphtheria under ordinary circumstances; and also the great importance of fresh air in its treatment.

A very interesting report of an *epidemic of mumps* was communicated by Dr. F. B. Haller; in the neighbourhood of Vandalia, "there seemed to be no escaping the specific influence of the disease, by those unprotected by a former attack; all fell victims." Metastasis among male adults, to the testes, occurred as a rule; this likewise appeared on boys, who were also liable to brain complication. Metastasis scarcely ever occurred among

adult females, and in no instance among young girls. In men the left testicle was most commonly affected, in some cases both were involved, it was believed that in some virility was lost as a result of the inflammation.

Tracheotomy in Croup and Diphtheria with Cases is the title of a valuable contribution to this subject by Drs. Lee and Fenger of Chicago, which contains a tabular statement of 22 cases operated upon, 17 by Dr. Lee, 5 by Dr. Fenger, most of which were cases of diphtheria; the former operator with six recoveries, the latter had three. The explanation of the serious mortality after the operation is that its performance is usually delayed until the case is otherwise hopeless. In the treatment of diphtheria much stress is laid upon the benefit of the *continuous* spray of carbolized lime-water by a steam atomizer, devised by Dr. Lee, both prior and subsequent to tracheotomy. The tube is to be removed for a short time on the fourth day, each day increasing the length of the time.

The early and lamented death of Dr. F. H. Davis, of Chicago, lends a sad interest to an article from his pen in this volume entitled "*Inhalations in the Treatment of Pulmonary Diseases*," in which the indications for the use of pulverized solutions with or without steam, and dry gases and vapours of volatile substances are very ably set forth, and the details clearly described. The volatile oil of eucalyptus is especially recommended; in profuse purulent secretion, it appears to be better tolerated than carbolic acid.

Dr. Wm. Hill, chairman of Committee, furnished an interesting *Report on Surgery*, and Dr. Fredrick Cole reported two cases, one of compound fracture of the ankle-joint (Pott's), and one of crush of the foot, in both of which by conservative surgery and continuous irrigation with iced carbolized water the foot was saved. Upon reading the account it appears very evident that the healthy condition of the patients, and their admirable hygienic surroundings, being in the fresh air of the country, had very much to do with the unusual result.

A very convenient universal extension splint for raising patients bodily from the couch, was devised by Dr. Verity; its construction is fully explained with its mode of application. The entire outfit can be made by any blacksmith, and need not cost over ten dollars; it seems to be of great utility in a number of conditions in which the patient is helpless or nearly so.

The *Report of the Committee on Advance in Obstetrics* urges the importance of making practical midwifery a part of the curriculum of every medical college, and the attendance upon such a course a prerequisite to graduation. They also report two instances of maternal impressions affecting the physical structure of the fœtus; and finally discuss the value of anæsthetics in labour, and urge the general but judicious use of chloroform, not carried to its full toxic effect. In a partial report from the same committee, Dr. L. H. Carr calls attention to the value of neurasthenia as an evidence of uterine disease, which, moreover, is generally its exciting cause. "The efforts to cure the disease of the nervous system, while ignoring the uterine disease, are failures in a greater number of cases than are the efforts to cure the uterine disease without addressing remedies directly to the exhausted nervous system."

In the *Report on Ophthalmology and Otology*, an interesting case of double optic neuritis from a violent fit of anger, followed by recovery, is recorded. The remainder of the report discusses the pathology of suppurative inflammation of the middle ear, and insists upon the importance of instituting early treatment, so as to prevent the dangerous results of pressure of retained products of inflammation in the tympanic cavity.

Insufflation by the Politzer or Valsalvian method is recommended, and also puncture of the membrane where there is much tension; the free use of the warm-water douche half an hour at a time will greatly relieve the pain and the attendant congestion. Bromide of potassium and chloral with opium is much more efficient than opium alone in the treatment of earache. In chronic suppuration nothing especially new is offered, beyond the general warning against neglect of ear discharges which so frequently produce fatal results. Astringent solutions of zinc. sulphat. (gr. iv), acid. carbolic. (gr. j), or plumbi acetas (gr. x) to the ounce of water are recommended. Boracic acid (gr. xx to ℥j) has also been used with good results; potassium permanganate seems too stimulating, and has been discarded by the reporter. In cases with perforation, after discharge has stopped, the artificial membrana tympani cut from writing paper, as recommended by Dr. Blake of Boston, has given good satisfaction. In all chronic cases of ear discharges, the importance of treatment of the naso-pharynx is acknowledged and insisted upon.

In eye diseases, cold applications for various forms of conjunctivitis, especially the purulent variety, as recommended by Dr. H. Knapp, of New York, are fully endorsed by the reporter, who believes that they offer a greater proportion of successes than any other treatment. The rules are first to see that the eye is kept clean, and, secondly, to persistently apply cold by means of very light compresses frequently wet with ice-water.

Dr. A. Z. Gill, after ably discussing the vexed question of the *Identity or Non-identity of Membranous Croup and Diphtheria*, and after a careful weighing of the evidence, offers the following conclusions:—

1. There is no distinction to be made from a microscopic examination of the exudate which would lead to a division of membranous laryngitis into non-diphtheritic and diphtheritic, or simple membranous croup and diphtheritic croup.
2. There is no distinction, clear and decided, to be made, based on chemical examination of the membranous product.
3. Every clinical manifestation by which a distinction might at first appear between diphtheritic and non-diphtheritic membranous laryngitis is unreliable, in a differentially diagnostic point of view.

A table of 23 cases of tracheotomy for croup or diphtheria is continued from 1879. The total reported from this state was 129, with 27.9 per cent. of recoveries: 36 recovered; 93 died; of these, nine died on the table or immediately after the operation. F. W.

ART. XIX.—*The Hygiene of Emigrant Ships.* By THOMAS J. TURNER, A.M., M.D., Ph.D., Medical Director U. S. Navy. 8vo. pp. 71. Franklin Press: Rand, Avery & Company, Boston, 1881.

THIS essay very clearly shows that the laws of the United States, designed to preserve the health and lives of passengers while they are on shipboard, are not respected by those whose business is to transport people across the sea between Europe and this country. In ten years (from 1870 to 1879), 1,561,126 emigrants arrived in New York. On an average they were at sea thirteen and a half days. Of those embarked in Europe 2518 died on the way here. From January to September inclusive, 1880,

nine months, thirty-four of the passenger ships that arrived at New York were reported for "overcrowding." Under the statutes, all those vessels together might receive on board an aggregate of 28,090 passengers. They received on board 33,266, or 5170 more than the law authorizes—an average excess of 156 in each ship. Of the whole number embarked, 37 died.

If thirty-seven persons died in the course of a voyage lasting from 9 to 16 days because more persons were taken on board than the law permits, the agents of the transportation deserve whatever punishment the law imposes for taking of life through negligence.

"Overcrowding" means requiring a larger number of persons to sojourn in a limited area than it was designed to contain without painful inconvenience or peril of health, and therefore signifies deficiency of pure respirable air, as well as the presence in it of foreign matters known to be detrimental to the health of most of those who respire air thus contaminated during any considerable time.

What proportion of those 37 deaths is undoubtedly ascribable to overcrowding?

Analysis of the tabular statement of the extent of overcrowding on each of these 34 reported ships, given by the author, shows that all the deaths occurred on 15 ships. Together they carried 14,874 passengers, of which number 2843 were in excess. On an average each ship received on board 991.6, which number includes 189.5 in excess of the number of passengers the law allows. The average duration of the voyage was 12 days 20 hours. One ship with 1331 emigrants on board, being 474 in excess of the number she may lawfully carry, lost 13 in the course of her voyage of 16 days.

On the other hand, 19 of the 34 vessels reported for overcrowding took on board 18,392 immigrants, an average of 968 on each, including an excess of 2327, an average of 122.5, without a death. The average time at sea was 11 days 21 hours.

The ships on board which passengers died were relatively very much more overcrowded than those on board of which none died, and they were at sea one day longer.

Within the same nine months, 575 vessels arrived at New York that were not reported for overcrowding. Of their 258,926 passengers 172 died. The mean duration of the passage was 12.7 days.

Such data alone do not show that deaths of passengers are ascribable to overcrowding only, but they very clearly imply that the provisions of law in this connection are disobeyed with impunity and without reference to the possible consequences to passengers.

The theme of Dr. Turner's praiseworthy essay is a proposed law, entitled the "Passenger act of 1880," which was presented to Congress April 8, 1880, by the Hon. Peter V. Deuster, of Milwaukee, Wis. Dr. Turner considers each section of the proposed law separately in succession, and ably discusses all questions and conditions which influence the comfort and health of people on board of ships. Incidentally to each section of the proposed act, he treats of overcrowding, ventilation, air, respiration, food, cooking, potable water, warming, humidity, dryness, dry-rot in ships, bilge water, sick quarters, water closets, etc. etc. An appendix contains the several laws in reference to the subject, reports of ill treatment of passengers and crews of ships, and a bibliography.

His experience afloat, his long devotion to nautical hygiene, his acquirements and ability, as well as the importance of the subject, entitle Dr. Turner's work to respectful attention. W. S. W. R.

Art. XX.—*Clinical Lectures on the Physiological Pathology and Treatment of Syphilis, etc.* By Fessenden N. Otis, M.D., Clinical Professor of Genito-Urinary Diseases in the College of Physicians and Surgeons, New York. Large 8vo. pp. xvi., 116. New York: G. P. Putnam's Sons, 1881.

The feature, for which Dr. Otis's book (which is a reprint of clinical lectures, originally published in the *Boston Med. and Surg. Journal*) will be most praised or blamed, is the development and advocacy of a theory which—while not altogether novel—is here pushed to an entirely novel extreme. The belief that syphilis is a disease, primarily and essentially, of the lymphatic system is not confined to the author; while, on the other hand, he probably stands alone in the attempt to explain away the existence of a syphilitic virus, and account for all the effects of syphilitic inoculation upon purely mechanical grounds. He seems to be satisfied with the conclusion that, *because*, in every syphilitic lesion there are found lymphatic vessels or spaces filled with imperfectly developed and abnormal lymph-corpuscles, *therefore*, all syphilitic lesions are due to obstruction of the lymphatics with such corpuscles. Beginning with the initial lesion, he thinks the introduction of diseased lymph-cells (if we understand him aright) from a syphilitic lesion sets up a morbid process in the cells with which they first come in contact, and that these communicate the vicious tendency to others, the rapid and immature multiplication of which results in a localized induration. Presently (to omit accidental phenomena) these cells get into the lymphatic ducts, sometimes causing them to swell up and become hard, and then pass on to the nearest glands. These becoming overcrowded, buboes appear. Next the growing host of the disaffected scatter everywhere, and the effects, often called first constitutional effects, upon the skin and mucous membranes are manifested. The natural continuation of this view accounts for all the later manifestations of syphilis.

Objections must rise in the mind of many a reader as he feels how interesting this theory is, and yet cannot, so readily as the author, apply it to all the facts. Why, for example, should distorted cells, which have escaped the rather coarse meshes of the lymphatic glands, and whose influence everywhere else is explained on purely mechanical grounds, affect the sympathetic nerves in some mysterious, un-mechanical way, and thus cause the roseola of early syphilis? Why should we be asked to recognize a "paresis of the vaso-motor nerves of the cutaneous envelope (skin?), caused by a special but limited paralyzing influence exerted upon the great sympathetic nerve, through positively recognized blood changes, immediately preceding, accompanying, or following an initiation of the so-called secondary or active period of syphilis?" That sounds all right, but we don't quite follow. The explanation suggests harder questions than those which gave rise to it, and we do not get up from it satisfied. Indeed, just here we receive the impression of a strain, on the part of the author, to account for a phenomenon to which his theory does not very well apply, and to give the *coup-de-grace* to Mr. Erasmus Wilson, for making too much of the idea of a *materies morbi*, which Nature attempts to eliminate by the skin and its reflexions.

Having thus expressed our failure to accept at once his theory, it is but just to Dr. Otis to say that there are few books on the subject of syphilis which we have studied with so much satisfaction as this one has given.

The careful and systematic elaboration of his theory has deserved and compelled close attention in attempting to properly estimate it, and we think, on closing his book, that the author is to be congratulated upon the success he has attained in a most difficult and arduous task. Others, in reading, may feel with us that the case is not quite proved, that, if a little less had been claimed, a great deal more might have been granted. But we feel sure that every careful reader of the book will be instructed, and that it will prove an important ally of those writings which maintain that syphilis is essentially a lymphatic disease, that its initial lesion has nothing whatsoever to do with the chancroid, that many subsequent phenomena are simply sequelæ. Finally, we wonder whether it will be long before some one shall arise to assert and maintain that there is no such thing—in an accurate sense—as hereditary syphilis; though such an opinion is as yet heterodox. C. W. D.

ART. XXI.—*A Treatise on the Continued Fevers.* By JAMES C. WILSON, M.D., Physician to the Philadelphia Hospital and to the Hospital of the Jefferson Medical College, and Lecturer on Physical Diagnosis at the Jefferson Medical College, etc. *With an Introduction* by J. M. DA COSTA, M.D., Professor of the Practice of Medicine and Clinical Medicine at the Jefferson Medical College, Physician to the Pennsylvania Hospital, etc. 8vo. pp. xviii., 365. New York: Wm. Wood & Co., 1881.

THERE is no class of diseases that are of more usual interest to the general practitioner of medicine, than "the continued fevers." In view of their frequency, their gravity, the fact that they attack all ages and conditions of life, that an accurate knowledge of their prophylaxis is essential in preventing their outbreak and arresting their spread, that their true treatment is still *sub judice*, it would appear none too soon to have in our country a modern text-book of the subject which should be satisfactory. Of course a description of continued fevers, and often a good one, is found in our works on Practice of Medicine, but these always fall short in respect to their amplification of details. Their general description of each disease from a clinical stand-point may be sufficiently graphic, but special symptoms are not dwelt upon at length, nor analyzed in such a way that the reader carries after their perusal, a full remembrance which will remain with him. If we turn to special works on this subject, either American or foreign, they are too elaborate in details, or in the form of lectures, and not written exhaustively as a systematic treatise should be.

The work of Dr. Wilson is preceded by a short, but admirable introductory chapter, by Professor Da Costa, on the general management of fever patients. In a few pages there is found an extract of much sound learning and wisdom. How well the happy medium in the medical doctrine of fevers is upheld! Let fever patients drink water and abundantly of it, but not immoderately, says Da Costa, and so as to keep the gastric vessels constantly tense and as a sure result engender complete inappetence, or even disgust, for nutritive fluids or solids. Give alcohol, says the same authority, when the first sound of the heart is wavering, uncertain, or completely suppressed, or when there is muscular tremor and delirium, and rapidly are these symptoms ameliorated. In regard to the

use of the cold bath, however, we have a word of criticism to offer. Are not its advantages much exaggerated and its risks withheld by the majority of writers? For our part we have endeavoured to do without cold baths in our treatment of continued fevers, mainly because we have not been able to comprehend the great utility of lowering even high temperatures during a few hours, when the cost price of each bath is almost invariably considerable fatigue and exposure. The heat-producing centres are not in this way permanently modified, nor to such a degree as to ward off visceral hyperæmias, from which certainly proceed the complications which are prone to bring about a fatal termination. Dr. Wilson's book is divided into seven chapters, which treat successively of the following diseases, *i. e.*: Simple Continued Fever, Influenza, Cerebro-spinal Fever, Enteric or Typhoid Fever, Typhus Fever, Relapsing Fever, Dengue. No classification is attempted, and for the reason that none is thus far placed on a scientific and well-recognized basis. Etiology should be the guiding principle in this matter, but our knowledge of the exciting causes of fevers is so limited as to preclude the possibility of a good division founded upon it. This we can scarcely admit to be correct. Some continued fevers are contagious, some are not. A few are connected solely with a miasmatic element; others are both miasmatic and contagious (Liebermeister).

In the first class the exanthematous fevers are properly embraced. In the second, dengue fever is included, and in the latter division we recognize typhoid fever and yellow fever. Why the author ignores absolutely a consideration of the eruptive fevers, including erysipelatous fever on the one hand, yellow fever on the other, he does not tell us and we are quite at a loss to appreciate his reasons. This is the more incomprehensible since he devotes 35 pages to the consideration of influenza (catarrhal fever) and 61 pages to cerebro-spinal fever (epidemic cerebro-spinal meningitis), which are not habitually described in chapters assigned to the continued fevers.

We approve highly, however, of the systematic manner in which each affection is portrayed, and particularly is this striking when the "analysis of symptoms" is considered at length after a fair, but brief, general description of the disease is given us under the head of "Clinical History." Simple Continued Fever is well written, and the author makes due acknowledgment to Ziemssen, Hirsch, Lewis Smith, Stillé, etc., but does not show that Dr. Wilson individually has cared for any of the cases which he describes. The opium treatment is the one most to be relied upon, but precaution should be observed when large and frequently repeated doses are given. The historical sketch of the disease is especially good, being, also, very complete and satisfactory in details. In the clinical history the author describes three varieties, the fulminant, the abortive, and the intermittent, which differ considerably from the ordinary forms. He objects very properly to the term "typhoid," as applied to certain grave cases on account of the confusion which has already arisen in regard to the connection between this disease and typhus fever.

In his historical sketch of Enteric Fever, Dr. Wilson pays a well-deserved tribute to Drs. Gerhard and Pennock, for their labours in first showing to Americans the points of wide divergence between this fever and Typhus. Enteric fever is endemic in North America over a wide extent of territory, and becomes predominant in large centres of population in proportion as wise sanitary regulations are neglected. Amongst the predisposing causes the influence of a dry, hot summer, and of adolescence

and early adult life, is particularly manifest. With the affluent the presence of stationary wash-basins, of bath-rooms and water-closets, is an additional danger of infection which the impoverished escape. The exciting cause of this fever has thus far eluded the most searching investigation, and it is known to us solely by its effects. Whilst this affirmation is unquestionably true, it is equally true that it is an organized germ.

Many properties of this germ are established, although its precise nature is not as yet determined. The author proceeds to enumerate these as follows:—

1. "It is invariably derived from a previous case of enteric fever.
2. "When introduced into the human body, it is, under favourable circumstances, capable of indefinitely reproducing itself.
3. "It is eliminated with the fecal discharges.
4. "It is not capable of producing enteric fever in other persons at once, but must undergo certain changes outside the body before it acquires this power.
5. "It retains its activity, when it finds its way into favourable situations, for a lengthened period after it has passed out of the body, the requirements to this end being decomposing animal matter, especially fecal discharges and moisture. Hence, cess-pools, sewers, drains, dung-heaps, wet manured soils, are its usual habitat.
6. "There is reason to believe that in such situations it is capable of reproducing itself.
7. "It remains suspended in, and may be conveyed by, water used for drinking purposes, and usually finds access to the body by this means.
8. "Suspended in the atmosphere, it also reaches the blood by means of the inspired air."

Facts and observations are given with ample details to corroborate the foregoing propositions. The clinical history, the analysis of the principal symptoms, the complications and sequels, the varieties, relapses, and anatomical lesions, are severally described in a clear and thorough manner, and will repay perusal as being a summary of the disease in these aspects, according to our most reliable and latest authorities. Under treatment we find some very sensible remarks in regard to prophylaxis. The views held of the general management of the patient are, also, judicious. The author insists upon care in diet, and refers to the pathological lesions which render watchfulness about the patients' food so essential. Special treatments by nitrate of silver (Pepper), calomel and iodine (Liebermeister), iodine and carbolic acid (Bartholow), are referred to with moderate commendation. We cannot agree with the author when he states that amongst methods of hydrotherapy, the cold bath is the most effective and least troublesome. Our feeling is, if we become affected with enteric fever, the same as that of Dr. Bristowe of London. "As to cold baths, I would rather not have them."

As soon, says Liebermeister, as 39.5° C. (103.1° F.) in the rectum, or 39.0° C. (102.2° F.) in the axilla, is reached, the bath is given. According to us this mode of treatment does not consider the fact that rise of temperature is essential to the normal march of enteric fever, and, therefore, seems irrational. And yet under the antipyretic treatment it is claimed by some eminent foreign observers that the mortality of enteric fever has immensely decreased (Liebermeister, Jurgensen, Brand). According to our experience this method may be suited to the enteric fever of Germany, but it certainly is not to the enteric fever of the United States, which is ordinarily of a milder type and requires less heroic management. Even the large doses of quinia which are given at intervals of 24 to 48

hours by those who have great confidence in the reduction of temperature by this means, do not appear wholly free from objections. Quinia reduces temperature in lowering heart action and arterial tension, and surely such result is not desirable when cardiac contractility is already greatly impaired.

In speaking of the use of digitalis the author states "it is *inadmissible* where the action of the heart is feeble." Special symptoms, complications, and sequels are to be treated in accordance with the general principles of therapeutics.

In his history of typhus fever the author gives a succinct, though complete account of different outbreaks of this dread disease. In many passages he cites the familiar names of Murchison, Hirsch, Clymer, Da Costa, etc. Whilst according to Lebert the exciting cause must be an organized germ, the exact nature of it is unknown. It is shown that typhus is pre-emimently contagious, and this is manifest "in proportion to the degree of intercourse between the healthy and the sick." In other words, the more protracted the time during which any one is exposed to foci of infection, the greater the probability of contracting this disease. Most epidemics of typhus tell the sorrowful tale of physicians, nurses, and others who have been in close attendance upon the sick being themselves sooner or later attacked. In 288 cases originating in the London Fever Hospital, 193 were nurses and other attendants in the wards. At the Salpêtrière in Paris, of the persons attached to the hospital 120 were attacked and 8 physicians died. The author properly objects to the term "coma vigil," being applied to two absolutely different conditions—and to its being neither explicit nor descriptive of any state. The general clinical description, as well as the more detailed analysis of special symptoms as referable to the different systems is methodical, correct, and in certain paragraphs written with considerable force and elegance, notably where the author portrays the *general appearance* of the patient ill of typhus fever.

A case is quoted from Da Costa to show how the characteristic eruptions of typhus and typhoid fevers may follow one another so closely as to occasion confusion in the mind of the observer in regard to the nature of the existing affection. Similar cases have been recorded by Murchison, Peacock, and Maclagen.

We commend highly the section upon treatment of typhus fever, which is explicit and judicious in most of its recommendations. We take exception, however, to an omission when the author recommends here without caution the use of digitalis as an antipyretic agent of value, whereas in enteric fever he considers its employment "inadmissible where the action of the heart is feeble." Now, then, the same acute granular degeneration of the cardiac muscular fibre is found as frequently in patients who die of typhus, as in those who die of enteric fever. For those who believe, as we do, that minute doses of digitalis are under these circumstances the most direct and best of all heart tonics, no such contra-indication exists either in the one case or in the other.

In the chapter on Diagnosis of Relapsing Fever, the author has wisely inserted a tabular statement which enables one, in a few moments, to estimate properly the great and essential differences which separate this disease, on the one hand from typhus, on the other from enteric fever. Clinically, relapsing and typhus fevers are certainly unlike, and the degree of their dissimilarity, as regards causation, future research will determine.

High temperature in this disease is certainly reduced by the use of cold baths and quinia, but evidence is lacking to show their influence in lessening the duration of the paroxysm, or preventing the relapse. The administration of parasiticides (sulphites, hyposulphites, chlorine) has been tried with indifferent success by Parry, and treatment on the expectant plan is upon the whole more satisfactory than any special form which has been recommended.

In concluding our notice of the author's work we take pleasure in commending it for accuracy in detail, method in arrangement, and thoroughness in research. We confess not to discover the evidence of the author's own experience in the large majority of his statements, but rather the proof of his industry. That he has read attentively, and wisely interpreted the works of distinguished authors in his choosen field of labour, we frankly acknowledge. But that he has recorded any individual views which are novel, we are compelled to deny. He has done well, however, in writing a work which supplies a certain want. We have no other systematic American work on fevers, full enough to satisfy practitioners, and at the same time brought up to the actual status of medical knowledge. For such Dr. Wilson's work is a reliable treatise. The only drawback is that the book cannot be procured without purchasing a full set of "Wood's Library of Standard Medical Authors." B. R.

ART. XXII.—*Index-Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects.* Vol. II. Berlioz–Cholas. 4to. pp. [12] 990. Washington: Government Printing Office, 1881.

THE second volume of this stupendous enterprise well sustains the reputation of its predecessor, and tends to show that the expectations formed regarding it, exalted though they be, are likely to be fully satisfied by the completed work. We say they are likely to be satisfied, for the reason that we believe Congress has not yet appropriated sufficient funds for the completion of the arduous undertaking in which Dr. Billings has engaged.

To give some idea of the scope and thoroughness of the work, we will say that this second volume "includes 12,459 author-titles, representing 4934 volumes and 9810 pamphlets. It also includes 11,550 subject-titles of separate books and pamphlets, and 37,310 titles of articles in periodicals." Consisting of 990 pages, it progresses from "Berlioz" to "Cholas." Taking the subjects at hap-hazard, it will be found that 68 columns are devoted to "Bladder" and its sub-headings, 28 columns are given to "Cæsarean Section," 49 columns to "Cataract," while the bibliography of "Chloral" occupies 11½ columns.

Sufficient has been said to show the great value of the second volume, and it remains but to add our sincere hope that Congress will furnish the funds and Dr. Billings enjoy the health to carry this invaluable work to a successful completion. S. A.

ART. XXIII.—*Manual for the Physiological Laboratory.* By VINCENT HARRIS, M.D. (Lond)., M.R.C.P., Demonstrator of Physiology at St. Bartholomew's Hospital, etc., and D'ARCY POWER, B.A. Oxon., Assistant Demonstrator of Physiology at St. Bartholomew's Hospital. Crown 8vo. pp. 124. New York: Wm. Wood & Co., 1881.

IT is the fashion in the English medical schools to separate histology from the chair of anatomy, to which it properly belongs, and to teach it in connection with physiology, with which it stands in no closer relationship than the coarser anatomy. Both anatomy and histology are merely descriptive of structure, and it seems strange that two divisions of one subject, both of which should be mastered before the study of function is attempted, should be separated by a line drawn at a point where the details of structure become microscopic.

The English schools, however, carry this peculiarity still further. We find that what are styled "Courses in Practical Physiology" are in all instances, with the exception, as far as we are aware, only of University College, London, and Trinity College, Cambridge, merely courses in histology, with the possible addition of a few simple exercises in physiological chemistry.

The Manual for the Physiological Laboratory of Messrs. Harris and Power furnishes an instance illustrative of this fact. It contains in all one hundred and thirteen pages, of which ninety-one are devoted to histology, and of the remainder, six are devoted to the simpler characteristics of proteids, one-half page to blood, one paragraph to bile, and one to the action of pancreatic juice, three pages to morbid and healthy urine, and two pages to glycogen, leucin, and tyrosin. About one-third of the pages in the book are blank.

Under the section of physiological chemistry the directions are so scanty as to render this portion of the book almost valueless for practical work by students. The histological section, as might be expected, is much more thorough, and generally, with the exception of the descriptions of the stomach and small intestine, in accord with recent observations. We cannot see that the book, as a manual for students of histology, possesses any great advantage over the many already published. R. M. S.

ART. XXIV.—*Public Health Papers and Reports, Vol. VI.* Presented at the eighth annual meeting of the American Public Health Association (New Orleans, La., Dec. 7–10), 1880, *with an abstract of the record of proceedings.* pp. 496. Boston, 1881.

THE remarkable success of the last meeting of our National Sanitary Association, held with justifiable triumph in New Orleans, that very home of the pestilence which the Society and its vigorous offspring, the National Board of Health, have done so much to baffle and control, is a fitting subject of congratulation among philanthropists throughout the world, and this goodly volume, presenting in admirable form the important papers and reports read before it, is a worthy monument of its eminently useful results.

After the thoughtful and scholarly address of the President, Dr. J. S. Billings, Surgeon U. S. A., we find placed in due prominence an exhaustive essay by Dr. T. J. Turner, U. S. Navy, which, as is well stated in the preface, will constitute for the present at least our chief authority upon the important questions forming its subject.

Public attention has been of late so generally aroused to the horrors of a steerage passage in our large emigrant steamers, that the accurate information and wise counsels of Dr. Turner, the outgrowth of life-long experience as a sailor, are at the present juncture of unusual interest, whilst the valuable appendices to his paper furnish certified facts which render his positions almost incontestable.

Dr. Henry B. Baker, the distinguished Michigan sanitarian, contributes an able essay upon the "Relations of Schools to Diphtheria, and to similar Diseases," which contains many suggestions in regard to this important branch of hygiene which concerns so vitally the entire coming generation of American men and women. Dr. Baker urges the appointment of sanitary inspectors of schools, who shall be executive officers of local boards of health; and he also advocates that most necessary precaution of isolating even the mildest cases of diphtheria (manifested by only a little sore-throat with slight fever), which experience has shown are fully capable of spreading the virulent contagion of this dreaded disease. Dr. Baker has added greatly to the value of his article as a popular educator by profusely illustrating it with improved charts, showing at a glance the prevalence and danger of diphtheria under various circumstances and in different seasons of the year.

An important addition to our knowledge respecting Dengue or break-bone fever is made by Dr. J. G. Thomas, of Savannah, Ga., in his essay upon this disease, which derives much of its present interest to the profession from its liability to become confounded, in some instances, with yellow fever. According to our author, it is to be distinguished from yellow fever by the absence of albumen in the urine, the infrequency of hemorrhage, and the low rate of mortality.

Valuable contributions from Dr. O. W. Wight, of Milwaukee, on the "Management of Contagious and Infectious Diseases in Milwaukee;" by Dr. Elisha Harris, of New York, on the "Domestic Pestilences viewed with Reference to our Warfare against them;" by Dr. Ezra M. Hunt, of New Jersey, "On our Present and our Needed Knowledge of Epidemics;" by Dr. G. B. Thornton, of Memphis, on "Memphis Sanitation and Quarantine, 1879 and 1880;" by Dr. Horatio R. Storer, of Rhode Island, on "Sanitary Protection in Newport;" by Dr. Jos. R. Smith, U. S. A., on "Disease among Texas Cattle;" a most important paper by Prof. Stanford E. Chaille, on "A Consideration of the Objections urged by some Evolutionists against Sanitary Laws, etc.," and by Dr. George M. Sternberg, U. S. A., on "Yellow Fever and Quarantine," all are worthy of extended notice did our limited space permit.

We cannot but regret that the *vis inertia* of the Association was so far allowed to control its action in regard to Dr. Albert L. Gihon's excellent "Report of the Committee on the Prevention of Venereal Diseases," and the very moderate recommendation which it contained. It seems to us, as we think it must to every advanced sanitarian, that the chief reason why wilful poisoning of others with the virus of various contagious diseases has not been declared criminal by our laws, is because legislators have been ignorant of its frequency and extent; and now that

scientific research has revealed its prevalence and supplied us with means for its detection, we consider that poisoning, whether with Paris green or with a Paris chancre, should be adjudged a capital crime, and be punished in extreme cases with the utmost severity. J. G. R.

ART. XXV.—*The Disposal of the Dead. A Plea for Cremation.* By EDWARD J. BERMINGHAM, M.D., Fellow of the American and New York Academies of Medicine, etc. etc. pp. 89. New York, 1881.

THIS thin and loosely-printed volume has for its "mission" an exposition of the evils of inhumation, the removal of the prejudice against cremation, and the securing of new advocates for this system of disposing of the dead. Dr. Bermingham first reviews the various methods of treating human corpses among the ancients, and among savage nations, including burial in the earth or in natural caves, suspension in the air or in trees, immersion in the sea, mummification, etc. He next considers the dangers which arise from ordinary burial, stating that the diseases prevalent in and near graveyards are notably diarrhœa, dysentery, throat affections, and fevers, and quoting the observations of Darwin in regard to the agency of earth-worms in bringing quantities of earth which may be loaded with septic organisms from considerable depths to the surface of the ground, and the direct experiments of Pasteur, who proved that soil covering the carcass of an animal which had died two years before of splenic fever still contained the deadly bacteridium of Charbon.

Our author argues in favour of the cremation of dead animals, and of that bugbear of Boards of Health—refuse garbage; meets the religious objection that cremation would interfere with the resurrection of the body, with Lord Shaftesbury's pertinent inquiry, "In that case what would become of the holy Christian martyrs who were burned at the stake?" and concludes that the one real obstacle to cremation, that it would promote the concealment of the crime of murder, could be overcome by suitable legislation respecting its practice.

Dr. Bermingham's style is disfigured by some obviously laboured bursts of artificial eloquence, but he has nevertheless given us a useful and instructive essay upon the great sanitary reform which constitutes the subject of his work. J. G. R.

ART. XXVI.—*Lectures on Syphilis, delivered at the Harveian Society, December*, 1876. By JAMES R. LANE, F.R.C.S., etc. Second edition. London: J. & A. Churchill, 1881. 8vo. pp. 95.

THE author, in a short preface, explains the object of these lectures to be to trace the progress of investigation in regard to venereal diseases during recent years, to indicate the points of general agreement, as well as those of difference, and to express impartially his own views. This purpose he has carried out in a very happy manner, writing from the standpoint of a "unicist," who holds that the "soft, suppurating sore" is sometimes followed by general manifestations of syphilis. The ground

for his opinion is stated thus: "I have repeatedly seen suppurating sores which I have had the opportunity of watching throughout their course, and which have never shown any induration *that I could discover* [italics our own], but which have nevertheless been followed in due course by constitutional disease." And, again, quoting the Medical Commission of 1864, he says: "Twenty-nine experienced witnesses gave evidence that sores, both soft and hard, may be followed by every variety of syphilitic eruption."

In all the discussions about the nature of the chancroid, soft chancre, suppurating sore, or whatever it may be called, we find unicists returning actually or practically to this untenable ground that every contagious sore upon the genitals that has not an indurated base is a soft chancre. Were this admitted, it would require no great experience to assert, and no one with any sense would deny, that the "soft chancre" is, not only sometimes, but often, followed by general syphilitic manifestations. Now, as far as the patient is concerned, it is all one whether the surgeon be a unicist and believe that the chancroid may be the initial lesion of syphilis, or be a dualist and believe that the initial lesion of syphilis may at times be indistinguishable by any physical characteristics from the chancroid. But in the interest of science it makes a great difference. The weakest point of the arguments in favour of unicism we believe to be the insisting upon resting the diagnosis of a certain venereal lesion upon the failure to discover one assumed physical characteristic of another, namely, induration. This is but negative evidence at best, and that of the weakest kind. Yet upon such a frail support rests a theory opposed alike to the dictates of reason and the results of the widest experience, namely, that the virus of a contagious, constitutional disease may communicate to a person as yet unattacked a purely local inflammation, which may, in time, communicate to a third the original constitutional disease. This is a way of putting the matter which, it appears to us, the unicists miss seeing. The question of induration as a sign of syphilis, to which they bring back the argument again and again, is as much settled in the negative for them as for dualists; and yet to this they return in all their experiments and observations. Dependence upon it is seen everywhere in their writings, in spite of open or implied disavowals of its importance.

Once let all syphilographers adopt the nomenclature of "initial lesion of syphilis" for such as are the first evidences of this constitutional disease, and "local venereal ulcer" for such as are not followed by it, and we would have a solid basis upon which to found experiments and observations. As it is, what can we argue from the testimony of one who founds a diagnosis, or excludes that of syphilis, upon the appearance of a single local lesion? How can we tell what he used when he says he inoculated an individual with syphilitic virus, knowing that he sometimes calls that syphilitic which never produces a remote manifestation? This is the reason for much of the confusion that exists in regard to the nature of syphilis. It takes some time for men to abandon terms to which they have been accustomed, and it will take time for all syphilographers to unite upon expressions which admit no possibility of misapprehension. When they do, however, we shall be able to banish the terms "dualism" and "unicism," and all will stand upon this plain platform:—There is a disease called syphilis, the initial lesion of which ordinarily presents certain specified characteristics; though these may be modified by numberless accidental influences, so that the most skilful observer shall fail to detect them. In

all such cases, however, the issue will prove the real nature of the lesion. Whatever it may resemble, it is an initial lesion of syphilis. It is the progeny and may be the parent of syphilis. Besides this, there are ulcerative lesions of the genitals due to irritating mechanical, chemical, or physiological influences, but purely local in their nature. These have nothing in common with syphilis except the accident of their location and ordinary method of acquisition. On account of this, however, and also of the fact that the modified initial lesion of syphilis sometimes closely resembles them, care should be exercised against making a false diagnosis of venereal lesions, and in consequence a false prognosis.

If this nomenclature were once generally adopted, and invariably used, the seeming differences among syphilographers would vanish. The facts are, on all sides, admitted. The author of the book before us describes the simulation of the "non-infecting chancre" (the local venereal ulcer) by the "true chancre" (the initial lesion of syphilis), and warns against misinterpreting either. Yet, that he himself has fallen into this error is clear from his statement that early mercurial treatment may avert "secondary infection." He himself says, a little further on, "there is really no absolute proof of the infecting nature of any given sore but the fact of infection itself."

In speaking of Boeck's process of syphilization he seems to fail to see the worthlessness, in an argument about unicism, of inoculations of a virus upon an individual already assumed to be saturated with it. He also practically indorses the illogical argument that because the inoculation of detritus from a syphilitic may occasion an ulcer looking like the chancroid, therefore this *is* a chancroid, and the chancroid is derivable from syphilis; and, because lesions resembling the chancroid are sometimes followed by syphilis, therefore the chancroid may be the parent of syphilis. In pathology things which appear to be equal to the same thing are by no means always equal to one another. And countless confirmations have established the fact that syphilis is always a constitutional disease—always derived from one who has, or will have, remote manifestations, and always communicating to a third the same constitutional disease that it was in the first or second.

Of the hypothetical "mixed chancre" of Rollet no better account could be given than we find here. Almost exactly as we have elsewhere expressed it do we find the author asserting that the initial lesion of syphilis ("indurated sore" he calls it, somewhat in contradiction to what he is explaining, namely, its occasional lack of induration) may be "excited to suppurate by the irritating properties of the soft matter placed upon it, *just as it would suppurate when irritated by a blister or by savine ointment.*" (Italics ours.) Here is the very point: that such a metamorphosis is not due to any specific property of the chancroid; that the chancroid has no specific property, but only a general irritating nature, which is common to many other materials. Such general irritants produce local lesions, but never, of themselves, constitutional disease.

Attention must be called to the fact that in the experiments of Auzias Turenne, in inoculating animals with syphilitic (?) matter, to which the author refers, only local lesions were produced.

The author in several points is compelled to express his dissent from the views of Mr. Hutchinson, who, in 1871, asserted that syphilis was a specific fever, like measles or smallpox; and, in 1874, that "mercury is the true *vital* and *physiological antidote* of the syphilitic virus;" and who very

recently uttered the opinion that "duality is dead."—whatever that may mean. The author shows, from English proofs, how unfounded is another of his opinions, namely, that syphilis is, "with few exceptions, either directly or indirectly, the parent of all phagedæna."

Mr. Lane is of those who believe that there is no such thing as a "specific" gonorrhœal poison; that gonorrhœa is a simple inflammation of a mucous membrane. He believes that syphilis is curable—not a peculiar belief nowadays—and, of course, in reinfection. In regard to the "infecting" properties of the secretions of syphilitics, he offers no decided opinion, though he seems not to hold very firmly the view that no unmixed physiological secretion can communicate syphilis.

The chapter on Hereditary Syphilis is very interesting. The author has never been convinced that the so-called Hutchinson teeth are pathognomonic of congenital (he means *inherited*) syphilis, and he agrees "with Mr. Lee that much unhappiness may be occasioned in families by the too ready assumption that they are invariably so caused."

The chapter on Visceral Syphilis concludes with a timely caution against *post hoc, propter hoc* arguments.

And here, though much more might be said, we must conclude our review. We have not hesitated to state positively our dissent from the author's opinions in regard to the nature of the so-called chancroid, and our deprecation of the logical methods of all unicists; nevertheless we most heartily commend the book before us to thoughtful medical men. It is a book to be read, not only for the important lessons it teaches, but for the careful and conscientious spirit which is everywhere manifest in it. It is a book of the sort which gives one a feeling of regard as well as respect for the personally unknown author.[1] C. W. D.

ART. XXVII.—*Dangers to Health: A Pictorial Guide to Domestic Sanitary Defects.* By T. PRIDGIN TEALE, M.A., Surgeon to the General Infirmary at Leeds. Third edition. 8vo. pp. 170, with 70 Lithographic Plates (mostly coloured). London: J. & A. Churchill, 1881.

As an evidence of the increased popular demand for information upon sanitary topics, we have to note the appearance of the third edition of Mr. T. Pridgin Teale's work on "Dangers to Health," just published by J. & A. Churchill, of London, the first edition having been issued about two and a half years ago. It belongs to a class of books, so popular of late, which are designed to convey instruction in matters pertaining to the every-day affairs of life. The method of attaining this object is particularly well chosen by Mr. Teale, as by means of coloured illustrations, with brief explanatory notes, the facts intended to be set forth are comprehended at a glance. The general public have not the time nor the patience to expend upon general treatises on sanitary science; their special interest is in matters relating to the sanitary arrangements of their homes, and any

[1] In the review of Dr. Tartenson's book on syphilis in this JOURNAL for July, 1881, the word "dualist" is twice found where the word "unicist" should have been. The first instance is at the beginning of third paragraph on page 228, which should read: "owing to the fact that Tartenson is a *unicist*, etc." Again, on the next to the last line of page 228, the reading should be: "This strikes us as an example of the customary logic of the *unicists*." C. W. D.

work that points out in a plain and simple manner *what to do* and *what to avoid* in sanitary construction will strike a popular vein and meet with encouragement. This is the chief secret of the success of Mr. Teale's book.

Our author tells us in his introduction that the design which he has set before him is to represent pictorially every important fault to which domestic sanitary arrangements are liable, so far at least as his information avails him, and to point out the consequences of such defects by instances of the illness produced thereby. We first notice sixteen "sanitary maxims"—added to the work since the first edition was published—which embody sound, practical advice for the householder. They serve as a text for the work, and very properly preface the illustrations. The endorsement of the "National Health Society," London, which has published copies for sale and distribution, is a sufficient guarantee of their correctness. The action of this society in making use of such a means of enlightening the public is not unlike that recently taken by the Department of Health of New York City, in preparing a series of seventeen rules[1] pertaining to drainage and plumbing which are to be a guide in all plans of construction, and is to be commended.

This edition contains seventy plates, which is an increase of fifteen over the number at first presented. Six of the old illustrations have been replaced by new and better ones. The illustrations are principally devoted to the portrayal of every defect in drainage that is likely to occur in and about our houses, the greater number of them very properly being confined to those faults most commonly met with. The evils resulting from bad ventilation and from accumulation of refuse matter about town houses also receive a share of attention. Finally, the author has appended to the pictorial portion of the work a catalogue of additional "defects" with brief descriptions, which were either difficult of illustration, or which, if illustrated, would have too greatly increased the price of the book. As it is, this appendix has greatly extended the scope of the work without materially advancing its cost.

As the illustrations are the distinguishing feature of the work, we may remark that Mr. Teale has by their use succeeded in producing a most instructive and in every way admirable guide to domestic sanitary defects. It abounds in hints which may be taken in at a glance, not a little of their value depending on the fact that they are founded upon actual occurrences, and not on vague speculations. The medical practitioner as well as the householder, landlord, and all who have to do with the sanitary construction and management of houses, will find this book of the greatest service.

It will be observed in glancing over the illustrations that, while there is a full display of the ordinary sanitary defects, but little attempt has been made to show how these faults are to be corrected, except in a very general way. This seeming defect in the work has taken place with the author's full knowledge, for, as he tells us in his preface, he has mainly accomplished the purpose of the book by pointing out the faults, leaving their correction to the intelligence and self-interest of the individual, who will naturally seek the advice of some expert or sanitary engineer. It would be difficult and perhaps unnecessary to designate how the various faults ought to be rectified—as, in the first place, conditions of locality and construction

[1] The San. Engineer, vol. 4, No. xix. p. 446.

would have to be considered, and moreover there might be a trenching "on matters concerning which there may be various solutions, various opinions, and changes in course of time." And, in the second place, the pictures themselves, in most cases, suggest in a plain manner the proper remedies to adopt.

Mr. Teale has been particularly felicitous in the manner in which he has grouped together the material for the presentation of many of his sketches. He has certainly succeeded in bringing home to his readers, "in a telling and unmistakable way," the great dangers to which dwellers in houses are so very liable from defects in drainage arrangements. The effect of a study of these sketches is to arouse a feeling of insecurity, and to provoke a diligent inquiry into the sanitary condition of one's own house. This is the prime object of the work, and if intelligent action shall follow upon the conviction that defects exist which tend to place health in jeopardy, then its philanthropic mission will be accomplished. This book is welcomed as a weapon in the hands of the public with which to combat dishonest builders of "bonus-houses" and unscrupulous speculators in human lives, and as a fund of information on practical matters for the enlightenment of the people, enabling them to pass judgment upon the vital points of sanitary construction, and thus protect themselves against the blunders and scamped-work of incompetent and dishonest mechanics.

The book contains a copious index and table of contents, and its mechanical execution is highly creditable to the publishers. W. H. F.

ART. XXVIII.—*Lectures on Digestion; An Introduction to the Clinical Study of Diseases of the Digestive Organs.* By Dr. C. A. EWALD, Lecturer in the Royal University of Berlin. Translated by ROBERT SAUNDBY, M.D., Edinburgh. Crown 8vo. pp. 149. New York: Wm. Wood & Co., 1881.

DURING the winter of 1878-79, Dr. Ewald delivered a course of twelve lectures to the physicians of Berlin on the Physiology of Digestion, in which the interests of physicians and clinicists received the first consideration, and the arrangement and treatment of the subject matter in this little book, which is the English translation of these lectures, is therefore from their point of view.

Dr. Ewald's former position as clinical assistant to Prof. Frerichs, himself one of the classical authorities on the physiology of digestion, is a guarantee as to the author's familiarity with the practical side of his subject, while his numerous and valuable original investigations in the domain of the physiology of digestion make him an authority from the scientific point of view.

It is needless, therefore, to refer to the contents of these lectures, other than to state that they are fully in accord with the standing of the science at the date of publication, and form the very best guide for the physician with which we are acquainted, the last lecture on Foods being especially excellent. We find it difficult, however, to explain Dr. Ewald's statement on page 55, that peptone does not furnish the xanthoproteic or Mil-

lon's reaction—a statement in direct contradiction to all experience, and which, if correct, would exclude peptone from the group of proteids. Dr. Saundby has greatly added to the value of the book by his fluent translation, in which the foreign idiom is entirely avoided. R. M. S.

ART. XXIX.—*Sanitary and Statistical Report of the Surgeon-General of the Navy, for the year* 1879. 8vo. pp. 361. Washington: Government Printing Office, 1881.

DR. PHILIP S. WALES, Surgeon-General of the Navy (appointed January, 1880), submitted to the Secretary of the Navy, November 1, 1880, his report for the year ending December 31, 1879.

It is of course a compilation from reports of many medical officers attached either to cruising ships or fixed stations. The work was probably done under a necessity of completing it at an over-near date, amidst routine office work daily claiming attention and dispatch. Under different circumstances it might possibly have been made shorter, and, in this sense, more acceptable to most readers. Government official reports, generally speaking, are prolix. They might say less, and yet tell more; many who are desirous to acquire the substance of their contents must do so at the least cost of time and labour, or not at all.

This report, designed to enlighten chiefly those Congressmen and officials whose duty requires them to read it, is likely to be more satisfactory in many respects to those of the profession generally who may consult it than previous annual reports from the same office. The arrangement of the materials is better, and bears internally suggestion of improvement in the future.

Those fiscal matters which are under the management of the Bureau of Medicine and Surgery are presented first in tables of estimates and appropriations. Next, it is stated that "the insane of the navy," in the Government Hospital for the Insane, numbered 41 September 30, 1879; and 40, September 30, 1880, 12 having been admitted and 13 discharged during the year.

The sanitary condition of the entire naval service, ashore and afloat, is stated: 468 patients continued from the preceding year; 13,983 admitted; 12,459 returned to duty; 1415 invalided; 96 died, leaving 481 under treatment at the end of the year. Tables showing the aggregate number of cases afloat, at hospitals and at stations, follow.

It is supposed that the laws restrict the number of enlisted men for the naval service to 7500 sailors, and about 1500 marines. The number of officers of all grades on the active list is about 1800; on the retired list, 290; marine corps, 90; and cadets at the Naval Academy, say 220, making in round numbers an aggregate of 11,310 persons who may need medical or surgical care.

The Surgeon-General says the number of persons employed afloat during 1879 was 10,388—"corrected for time, 8869."

The sanitary condition of the "force afloat" is represented in tables exhibiting the number of patients in each squadron, the classes of diseases,

mortality, etc., of each, with incidental comments. The vaccination of 3545 persons is reported. In this connection the Surgeon-General remarks: "The care taken to protect sailors from smallpox by vaccination results undoubtedly in incalculable advantage, and, it may be said, has almost completely stamped this disease out of the navy. The cases reported were seven in number, or 1.01 per M., occurring in ships lying in infected ports."

The section of the report which contains most of interest to the profession generally is that on recruiting.

Medical-Director Gihon reports the results of the physical examination of 6129 lads, candidates for admission to and pupils in the Naval Academy, with a view to fixing a standard of physical measurement for the admission of cadets and apprentices to the naval service. In each case he has tabulated the *weight* of the nude body; *height* from vertex to soles; *circumference of thorax* over the nipples; *expansion*, or difference between maximum and minimum girth; *vital capacity* as indicated by Hutchinson's spirometer; and *strength* as shown by a spring dynamometer, with the age of the examinate.

In compiling and tabulating these observations, Dr. Gihon has taken every precaution necessary to avoid error. His well-done work is an important and valuable contribution to vital statistics.

Surgeon J. S. Knight and Past Assistant-Surgeon Magruder contribute very interesting observations in connection with the enlistment of apprentices. The latter states that the most frequent cause of rejection of lads seeking to enter the navy as apprentices is "irritable heart," which he attributes either to the use of tobacco or to masturbation.

There are some very valuable remarks and suggestions in connection with the importance of a thorough chemical and microscopic examination of atmospheric air, by the Surgeon-General and Drs. J. H. Kidder and Flint, with a detailed description of the method proposed for conducting observations over an extensive field.

Surgeon J. H. Kidder presents observations on the nutritive value of the naval ration in connection with the sustenance and growth of men and apprentice boys.

Reports on the sanitary condition of the several stations follow. The general report of each squadron is accompanied by a report of the sanitary condition and hygienic circumstances of each vessel included in it, as well as on the medical topography of ports visited by them. An outline map, showing the geographical limits of the station, and tracings exhibiting a synoptical view of the atmospheric conditions on each ship during the year, with the places visited, etc., illustrate each report. The hospitals, navy yards, etc., within the bounds of each station, are considered in the report in connection with it.

The report of Medical-Director Albert L. Gihon on the sanitary condition of the Naval Academy at Annapolis embraces, among other hygienic matters, a statement of his opinion based on personal observation during five years as the health officer of the institution, "that beyond all other things the future health and usefulness of the lads educated at this school require the absolute interdiction of tobacco." This opinion is sustained by arguments which will be accepted as conclusive by all physicians and sanitarians; but they may be nevertheless without influence on those who have authority to prohibit the use of tobacco by all naval cadets.

Our limits do not permit mention of very many interesting subjects which are ably presented in this report by competent observers. No better evidence is needed, we take leave to say in passing, of the beneficial influence of competitive examinations—inaugurated 1824—for the admission and promotion of medical officers of the navy, than is exhibited in the quality of their contributions to this report. By the labour he has bestowed upon it, Dr. Wales has won a clear title to the approbation of the naval service.

Larger type where very small is used, and paper of better quality might have been employed. The report is intrinsically worthy of a much better presentation and binding than the Government Printing Office has bestowed upon it. W. S. W. R.

ART. XXX.—*A Text-book of Human Physiology. Designed for the Use of Practitioners and Students of Medicine.* By AUSTIN FLINT, Jr., M.D. 3d edition, 8vo. pp. 948. New York: D. Appleton & Co., 1881.

THE appearance of the third edition of this well-known text-book is an evidence that the author has shown good judgment in the adoption of the plan on which it is based, and ability in putting it into execution. It is a work based on the French rather than the German school. The subjects are treated after the natural history method and are almost encyclopedic in their completeness. With all the evident care to bring the work up to the times, it is unfortunate that more space was not alloted the important subjects of blood pressure and electrotonus. The chapter on embryology is in like manner unsatisfactory. It reflects none of the remarkable progress made in this branch of physiology during the last seven years. H. A.

ART. XXXI.—*A Practical Treatise on Surgical Diagnosis, designed as a Manual for Practitioners and Students.* By AMBROSE L. RANNEY, A.M., M.D., etc. Second edition, enlarged and revised. 8vo. pp. xiii., 471. New York: William Wood and Company, 1880.

WHEN we prepared a short notice of the first edition of this book, eighteen months since, we ventured to express some doubts we entertained concerning the plan adopted by Dr. Ranney, and questioned whether it would be found satisfactory. Within a little more than a year, however, a second edition has been called for, and the book has been considerably enlarged, having grown from three hundred and eighty-six to four hundred and seventy-one pages, the additions consisting to a good degree of descriptive text; indeed, Dr. Ranney tells us that he has changed his "opinion somewhat since this work was first issued, as to the advisability of employing the plan of contrast of symptoms, in the form of differential tables, to the exclusion of descriptive text." The enlargement which this conclusion has led to, has very materially enhanced the value of the work. Some errors of statement have been corrected, and although some

remain, as will be the case in any uninspired volume, there is a manifest improvement. Successive revisions of a book, which seems likely to be popular, will doubtless still further indicate progress. The description of rickets is one which will bear revision. The new index which has been prepared is a decided improvement over the last. We think that the value of the book as a work of reference would be enhanced were catch words printed at the head of each page.

We incline to the opinion that this volume of Dr. Ranney's will be of special service to lecturers upon surgery, and were we called upon to prepare a course of such lectures, we should instinctively turn to this book as a very suitable skeleton upon which to build a superstructure, and we should, under such circumstances, gladly use many of the excellent symptomatic tables contained in it.

The book is well printed, upon good paper, and is bound in exceptionally heavy bevelled boards. S. A.

ART. XXXII.—*The Microscope and its Revelations.* By WILLIAM B. CARPENTER, C.B., M.D., F.R.S., etc. etc. Sixth edition. Illustrated by 26 plates and 500 wood engravings. Pp. 882. Philadelphia: Presley Blakiston, 1881.

WHEN an encyclopædia of Microscopy like this has been endorsed by the tens of thousands of purchasers required to carry it to a sixth edition, there can be but one opinion respecting its intrinsic value, and the chief duty of a reviewer is to determine whether it has been kept abreast of the advancing science whereof it treats. This we find its indefatigable and industrious author has faithfully done, and we must conscientiously recommend the book to every microscopist as a necessary implement towards his satisfactory progress.

We observe Dr. Carpenter still esteems the Podura scale as the best test for practical working lenses; but on page 205 he states its true structure is still a subject of discussion, although further on in the volume he expresses his own conviction that the well-known "exclamation markings" are "the optical expression of a corrugated or ribbed arrangement of the lower membrane of the scale, slightly modified by the internal structure of the upper membrane," in opposition to the doctrine of Dr. Royston Pigott, that "they are altogether false and illusory." Dr. Carpenter seems to be quite ignorant of the curiously-conclusive demonstration of the true nature of these markings, announced by Prof. J. W. S. Arnold, M.D., of New York, who by the ingenious method of carbonizing a scale, and then breaking it by pressure under a thin glass cover, obtained several perfectly distinct and isolated "exclamation marks," photographs of which are now in our possession, and absolutely prove that these objects are separate entities, and not mere optical illusions. J. G. R.

QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

The Development of the Retina.

The investigations of Löwe apparently showed that the retina of mammalian animals is developed in a manner diametrically opposite to that of birds and batrachian reptiles. This remarkable conclusion, exceptional as it is to the general laws of development, has led to an extended investigation of the subject by Ogneff, of Moscow, who has arrived at the opinion that the appearances seen by Löwe are for the most part the result of his method of treatment, which is ill-suited to so delicate a structure as the embryonal retina. Löwe distinguished in the earliest stage of development four layers—(1) the external limiting membrane; (2) a layer of clear elements, not everywhere continuous; (3) a layer of small, round, dark, radiating bodies; (4) a clear homogeneous mass, in which here and there indications of a radiating striation could be perceived. But Ogneff finds at this period only spindle-shaped cells, with oval nuclei and a fine ring of protoplasm, from each extremity of which processes extend. Here and there on the outer surface were large clear cells, with roundish nuclei. No special limiting membranes could be perceived. The first visible change consists in a division of the innermost cells, which also become large and round, with more conspicuous nuclei and more numerous processes, of which the inner curve round and run parallel with the inner surface of the retina. These are, without doubt, the earliest appearance of the nerve fibres. The processes of the outer layer of cells can be clearly traced through the whole thickness of the retina, and some of these processes are thickened at the extremity—the embryonal form of Müller's fibres, which Löwe states do not appear until a much later period. The clear elements on the outer surface described by him could not be discovered by Ogneff at this period. The further changes in the retina consist in this, that between the embryonal nerve fibres and the spindle cells lying immediately outside them appears a narrow streak, the indication of the molecular layer. It is interrupted in places by the two cellular layers. From what the substance of this layer is developed, Ogneff could not discern; but it appears to consist of numerous nerve-cell processes and the embryonal Müller's fibres and other fibres which run vertically, these fibrillary elements being accompanied by extremely fine granules, easily separated by maceration in water. It does not at this period appear to contain a special spongy substance. Subsequently these layers, and especially the molecular and nerve-cell layers, undergo further development. They become more

sharply limited, and increase in thickness. In the former free nuclei become visible, and also roundish cells, which are irregularly scattered in the mammalia, but arranged in series in pigeons. The differentiation of the retina terminates with the appearance of the rods and with the two granular layers. The rods are not formed, as Löwe asserts, beneath the external limiting membrane, but appear opposite the processes of the cells which lie on the outer part of the retina. The separation of the two granular layers commences just before the appearance of the rods; the cells in the outer part of the retina divide and become much smaller, but those lying most deeply are rather larger than the others, and roundish. From this description it appears that the process of development of the mammalian retina occurs in the same manner as in birds and batrachia.—*Lancet*, Sept. 3, 1881.

MATERIA MEDICA AND THERAPEUTICS.

Action and Uses of Antipyretic Medicines, including the Influence exerted by Medicines administered internally upon Septicæmia and Allied Conditions.

In a paper with this title read at the London Congress, Prof. BINZ summarized his views as follows:—

1. In the present state of our knowledge, there are two modes in which antipyretic remedies may be conceived to operate: first, by increasing the discharge of the pyrexial heat; secondly, by checking its production.

2. The quantity of heat discharged may be augmented by direct withdrawal (tepid water), or by facilitating the circulation through the skin (digitalis, cutaneous irritants).

3. Heat production may be lessened by repeated cooling of the surface, and especially by the internal use of anti-zymotics.

4. Febrile diseases commonly owe their origin to the introduction and rapid development of substances akin to ferments. Several of these have been shown to resemble yeast in being low vegetable organisms, or derived from such organisms. They enter the glands, where they undergo multiplication, increase the metabolic processes, generate products of decomposition which exert a paralyzing action on the nervous system, and raise the standard of temperature throughout the body.

5. Owing to impaired action of the heart in certain stages of the disorder, or to contraction of the cutaneous vessels, the skin becomes anæmic, and gives off less heat than usual. The internal temperature rises accordingly.

6. Quinine, our chief anti-pyretic, acts by directly combating the efficient cause of the disorder, and by checking the abnormal metabolism going on in the body. The nervous system takes no part, or only a secondary part, in this operation. In intermittent fevers, quinine prevents the paroxysms by attacking their infective cause. The paroxysms are not the essence—the substantive element—of the disease; they are only a symptom of it. The substantive element is the poison deposited in the colourless corpuscles of many organs, especially the spleen. There are fevers without paroxysms, and paroxysms without fever. It is just those intermittent fevers which run their course without paroxysms that are the most malignant. The malarial poison rapidly causes disintegration of the tissues and the blood, and so paralyzes the nerve-centres.

7. The reduction of acute splenic tumours by quinine depends upon the adverse influence exerted by the alkaloid on the infective poison to which the morbid over-action of the spleen and its consequent enlargement are due. "*Cessante*

causâ cessat effectus." Even a healthy spleen may be reduced in size by large doses of quinine; the alkaloid vigorously checking the oxidation of its principal elements, the colourless corpuscles. Quinine has no direct influence on the vaso-motor nerves.

8. Quinine attacks the malarial poison with especial energy; on this fact depends the so-called specific action of quinine in intermittent fevers. The same relation, but in a minor degree, subsists between quinine and the infective poison of enteric fever, between mercury and iodine and the poison of syphilis, between salicylic acid and the "irritant" in acute articular rheumatism.

9. An antipyretic which, in one disease, instantaneously arrests the fever, may be wholly powerless in another. The difference depends on the fact that the various anti-zymotics act very unequally on the individual *schizomycetes* and ferments; one will paralyze them rapidly, by another they will hardly be affected.

10. The past history of therapeutics, and recent achievements in the domain of etiology and pharmacology, entitle us to assume that by persistent scientific inquiry and practical observation, we may succeed in discovering a specific antidote for every species of infective or septicæmic malady.

Prof. Fokker, of Groningen, held that, while there is no great difficulty in understanding the mode of action of simple refrigeration in the treatment of pyrexia, that of antipyretic remedies, administered internally, is still obscure. We must assume, either that they lower the temperature of the body by interfering with the circulation, or that they exert a destructive action, in virtue of their antiseptic properties, on the humble organisms to which the pyrexial phenomena are presumably due. The second of these hypotheses is the more likely one of the two. It may, of course, be objected that such remedies can never be administered in sufficient quantity to insure their presence in the blood in such proportions as to render it aseptic, or, at any rate, to exercise an antiseptic influence. But it must not be forgotten that the organisms in question have to maintain a "struggle for life" in the interior of the body; so that any hostile factor, though unable of itself to check their multiplication, may succeed in doing so when combined with others equally hostile to bacterial life. It is quite possible, moreover, that antipyretic medicines may accumulate in particular organs, which may then exert a disinfectant influence upon the blood.

Antipyretic remedies may legitimately be given in febrile maladies, when the heat of the body is such as to directly threaten the patient's life, or even the integrity of his tissues. Under such circumstances, those aromatic remedies which are, at the same time, bacterial poisons, should be preferred to physical methods of refrigeration. But when the temperature of the body does not rise to a dangerous height, the employment of such remedies in antipyretic doses is undesirable; since we have experimental evidence to show that a degree of heat only a little above the normal temperature of the body is injurious to the vitality or the virulence of the pathogenic organisms. It is quite possible, indeed, that the febrile heat may be one way in which the system reacts against these organisms, and tends towards recovery. In all cases, therefore, when the temperature does not rise so high as to be of itself a source of danger, physical refrigeration should be avoided, and the antipyretic remedies, whose twofold mode of action has been alluded to above, should only be prescribed in relatively small doses, such as are inadequate to reduce the heat of the body.

Utility of Strychnia as an Expectorant.

The experiments of Prokop Rokitanski have shown that strychnia is a powerful stimulant of the respiratory centres. Dr. Milner Fothergill, in a paper

read at the London Congress, stated that, without acquaintance with his experiments, he arrived, independently, at the same conclusions, from experiments upon rabbits. When the respiratory centre was paralyzed by aconite, the injection of strychnia exercised a most potent influence in restoring the respiration. Clinical observation corroborates this view; and, at the Hospital for Diseases of the Chest, he has found strychnia most useful when the respiration was embarrassed. In acute bronchitis, when the act of expectoration is difficult, it is useful. In chronic bronchitis and emphysema it relieves the labouring respiration, and, when the right ventricle is dilated, adds to the efficacy of digitalis most usefully. In lung consolidation it is also of service; indeed, in all cases where the number of respirations mounts over the ordinary proportion to the beats of the heart (about four to one), it has seemed to me to be of the greatest utility.

MEDICINE.

Typhoid Fever considered as Fecal Intoxication.

Dr. JULES GUÉRIN, of Paris, read a paper on this subject at the London Congress, of which the following is an abstract:—

For a long time the deposits of human excrement were considered to be susceptible to contribute to the development of typhoid fever. This opinion, expressed with a certain character of generality, and, besides, deprived of any serious demonstration, had remained in conflict with all opinions of the same kind. Up to what point was it founded? In what measure, under what form, in what conditions, could the fecal excretions have a share in producing typhoid fever? In order to elucidate, if not to solve, these various questions, the author of this work has given himself up to experiments on animals, and to clinical researches, which have led him to the following conclusions:—

1. The specific diarrhœic matter of those affected with enteric fever, contains at its exit from the body toxic elements resulting from the fermentation of fecal matters, retained and accumulated at the end of the small intestine, behind the ileo-cœcal valve.

2. The organic lesions, considered heretofore as specific signs of typhoid fever, congestion, ulceration of the mucous membrane, alterations of the glands of Brunner, Peyer's patches, and mesenteric glands, are effects of the virulent and ulcerative action of typhoid matters on these parts; and the functional troubles, or general symptoms of the illness, are at the same time the result of the penetration of these same matters into the organism, and of the organic changes which they determine.

3. The complications which present themselves in the course of typhoid fever, under the form of meningitis, pleurisy, pneumonia, and other marked affections, are only more distinct localizations of its poisonous principle, just as those illnesses which begin at the outset with typhoid symptoms, are in themselves nothing but primitive effects of fecal poisoning.

4. Typhoid poison engendered by fecal fermentations, spreads itself incessantly abroad by all the excretory ways of the body, from whence the transmissibility of the illness, and the formation of seats of infection, susceptible of reproducing it in an endemic and epidemic form.

Every one of these propositions has been the object of experiments, and of clinical and anatomo-pathological observations, stated in three memoirs read before the Academy of Science and Medicine in Paris, in the years 1877 and 1878, with proofs to the point. The author will reproduce both before the Fourth

Section of the International Congress, and will accompany them by observations and new experiments, which have only tended to confirm him in his opinion.

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Existence of Two Distinct Forms of Eruptive Fever, usually included under the head of Measles, and the Relation to them of so-called Rubeola or Rötheln.

Dr. W. B. CHEADLE, of London, at the London Congress, read a paper with the above title, of which the following is an abstract:—

That one attack of a contagious exanthem confers upon the individual who experiences it immunity from any further attack of the same disease is a rule which has been found to hold good with regard to measles as generally as it does in the case of scarlatina or smallpox.

Yet in two recent epidemics, both of them of severe and pronounced type, which followed one another in the same district within the year, it was found that the individuals who suffered in the first epidemic obtained no immunity from the second; and, further, that no previous attacks whatever of ordinary measles exercised any protective power against the second epidemic. Of thirty cases of this second epidemic, in which absolutely reliable histories could be obtained, twenty-two of the patients had had measles before, and ten of these under the author's personal observation, within the year.

Certain deviations from the common type, such as a shorter period of incubation, severe laryngeal symptoms, and other special features, taken together with the fact that previous attacks of ordinary measles conferred no protection, prove the disease of the second epidemic to be an essentially distinct exanthem. The question then arises whether it was a new and unrecognized form of eruptive fever, or the only other known form of measles, Rötheln. The exceptionally severe and even malignant character of the disease at the outset would seem to negative the idea of Rötheln, which is always described as a disease of an invariably mild type. But after weighing all the facts, the conclusion is arrived at that the disease was Rötheln, which prevails not only in the slight form which is acknowledged, but in a severe and malignant form also, hitherto not recognized as Rötheln, but erroneously described as an exceptionally severe variety of common measles.

—

Real Position of Rötheln, Rubeola, or "German Measles."

Dr. WILLIAM SQUIRE, in a paper read at the London Congress, gave a short historical survey of the literature of this disease, and showed that it was known before it received a distinctive name.

The disease, in his opinion, has but a superficial resemblance to scarlet fever, but has close relations to measles in several points. But it is self-protective, is as distinct from measles as varicella is from variola, and possesses all the marks of a specific disease. It is contagious; it runs a definite course; it occurs but once in the same person.

Dr. KASSOWITZ stated that, 1. In the epidemics of rötheln which have come under his observation, he has never noticed the affection passing into true measles.

2. The resemblance to measles is, nevertheless, sometimes so marked, both as regards the eruption and the associated phenomena, that in any single case the distinction from the milder form of measles, which runs a rapid course, is rendered extremely difficult, and, in such circumstances, can generally only be made by having regard to other cases in the same house and family.

3. If this affection has any special relationship to any other acute exanthem, it is to measles, not to scarlet fever, that it is allied.

Dr. J. LEWIS SMITH, of New York, drew the conclusion from a study of a large number of cases, mainly occurring in two epidemics observed by himself, that rötheln is a distinct specific disorder.

It is an exanthematic fever, mildly contagious. It resembles varicella in general mildness of symptoms, in the absence of dangerous complications, or sequelæ, and in the uniformly favourable prognosis; while its symptoms and history show a resemblance to measles and scarlet fever.

Its incubative period varies from seven, or perhaps fewer, to twenty-one days. Rötheln requires no treatment.

—

Local Treatment of Diphtheria.

Dr. MORELL MACKENZIE, of London, discussed the important subject of the local treatment of diphtheria at the London Congress, and the following is a summary of his views:—

1. *Ice* useful in first stage, both internally and applied externally to the neck, contra-indicated when it causes pain, in young children, in advanced stages, and especially if gangrene be present.

2. *Steam inhalations* are of great service when the false membrane shows a disposition to separate, and when it is situate in the larynx or trachea.

3. *Solvents* administered by swabbing, or in the form of spray, are often highly beneficial. Lime-water and lactic acid the best.

4. *Antiseptics are very important:* carbolic acid, permanganate of potash, and chloral hydrate; the last being the most certain.

5. *Antaerics*, or *varnishes, i. e.*, remedies which exclude the air from the false membrane. Tolu dissolved in ether is the most serviceable; simultaneous employment of other local remedies (ice, steam) not prevented by the use of these agents.

6. *Caustics* are always injurious, whilst *astringents* are useless and sometimes hurtful.

Mr. LENNOX BROWNE, of London, expressed his preference for lactic acid as a solvent, and urged the constant use of ice, and of beverages containing chlorate of potash, the last measure acting constitutionally as well as locally.

Removal of enlarged tonsils he also advocated even during an attack of diphtheria, as a local measure calculated to have the best results; (1) as removing an impediment to the respiration; (2) as preventing the downward progress of exudation; and (3) as an early substitute for, or prevention of, the more dangerous measure of opening the windpipe.

—

Subcutaneous Nodules connected with Fibrous Structures Occurring in Children the Subjects of Chorea and Rheumatism.

Drs. THOMAS BARLOW and FRANCIS WARNER called the attention of the members of the London Congress to certain nodules varying in size from that of a mustard seed to that of a bitter almond, which are strictly subcutaneous, the skin over them being simply raised, and without any heat, pain, redness, or infiltration. In most situations they are slightly movable. They occur in connection with fasciæ and tendons, and especially near joints. The back of the elbow, the malleoli, and the margins of the patella are the commonest sites. Other situations are the neighbourhood of the vertebral spines, the spine of the scapula, the cresta ilii, the extensor tendons of the foot and hand, the temporal ridge, and the superior curved line of the occiput. They are mostly symmetrical.

In regard to minute structure, they consist of small masses of loose fibrous bundles, sometimes very vascular.

In regard to evolution: 1. These nodules may appear in one crop, *i. e.*, several nodules appear simultaneously in different parts of the body. 2. Successive nodules may appear. 3. The nodules subside generally within a period of two months. 4. They may partially subside, and then undergo recrudescence. 5. After complete subsidence, so far as manipulation can determine, a new crop may appear. 6. They never become bony, and never become infiltrated with urate of soda. 7. Their evolution is not attended with pain, and rarely with marked pyrexia. Often during the time when they are present there is no pyrexia.

These nodules are to be clearly distinguished from—(*a*) The nodi digitorum of Heberden. (*b*) Gouty nodules. (*c*) Erythema nodosum. (*d*) Syphilomata. (*e*) Scrofulides.

In regard to age, they have been observed by us only in children and young adults, the limits being 4½ years and 19 years.

In regard to sex, out of 26 cases 17 were female, 9 were male. In all the cases it was believed there was heart affection.

13 out of the 26 cases had well-marked chorea; 8 had erythema marginatum, or erythema papulatum; 1 had purpura in addition.

There was a history of acute rheumatism, in 10, and of subacute rheumatism with vague joint pains, in 8.

It is submitted—1. That these subcutaneous nodules may be taken as indicative of rheumatism in children. 2. That when found associated with heart disease and chorea, although no history of rheumatic fever can be obtained, nevertheless their presence gives a presumption that the chorea is rheumatic. 3. That in regard to prognosis and treatment, although the nodules are unimportant in themselves, they are nevertheless of serious import, because in several cases the associated heart disease has been found actively progressive. 4. That in nature they are probably homologous with the inflammatory exudation which forms the basis of a vegetation on a cardiac valve.

—

On Rheumatism, Gout, and Rheumatic Gout.

In a thoughtful communication presented by Mr. JONATHAN HUTCHINSON, at the London Congress, the following propositions were made.

That rheumatism is, in the main, a liability to joint-disease, brought about by exposure to cold and wet, through reflex nervous influences. (A catarrhal arthritis.)

That gout is, in the main, a liability to joint-disease, brought about by certain articles of food, by defects of assimilation and of excretion. (A humoral arthritis.)

That in each disease, although the joints suffer most prominently, they by no means suffer alone.

That in each, by transmission through many generations, a diathesis is formed which is heritable, and which gives peculiarity to the diseases from which its subjects may suffer, and which stamps them as "gouty" or "rheumatic."

That gout and rheumatism are very frequently present together. Rheumatism is very often met with without gout, but gout is seldom present without rheumatism. Sometimes the two exist side by side, and attack the same patient at different times, but more frequently they become mixed and produce a hybrid disease. (Rheumatic gout.)

In connection with hereditary descent, various maladies are to be affiliated with gout and rheumatic gout, which differ somewhat from both—certain forms of iritis; hemorrhagic retinitis; universal crippling rheumatism (chronic rheumatoid arthritis); some forms of glaucoma, lumbago, sciatica, and neuralgia; *nodi digitorum*, and possibly hæmophilia.

On Certain little recognized Phases of Tabes Dorsalis (Locomotor Ataxy).

Dr. THOMAS BUZZARD, of London, in a paper presented at the recent Medical Congress, at London, drew attention to the overwhelming prominence amongst the symptoms which has been given both by Romberg and Duchenne (de Boulogne) to the incoordination of movement often observed in tabes dorsalis. In consequence of this, the symptom (which is very frequently absent) has come to be regarded as the essential one, and to many persons the idea never occurs that a patient who has no ataxy may be an example of the disease. So it comes to pass that any one symptom which happens to be more than usually prominent is apt to absorb the attention, and the ailment is probably referred to some widely different pathological condition. The author accepts Westphal's symptom (the absence of the knee-phenomenon) along with good voluntary power in the anterior muscles of the thigh, as almost positive evidence of the existence of tabes dorsalis when it is associated with any one or more of the recognized symptoms. In illustration of the tendency there is for tabes to be overlooked if no ataxy be present, he relates five cases in which the *crises gastriques* (of Charcot) were so strongly marked as to monopolize attention, which would hardly have happened had the symptom from which Duchenne named the disease been present. In one of these the author found absence of knee-phenomenon, pupils small, contracting in accommodation, but not to light, lightning pains, along with the gastric crises; but this latter symptom was so predominant that the case was subsequently pronounced by others to be one of cancer of the stomach, notwithstanding that the gastric symptoms had existed paroxysmally for fifteen years. In another, correctly diagnosed as tabes dorsalis, and shown to him by Mr. Herbert Page, to whom the patient had applied on account of joint-disease in the foot, there was a history of obstinate vomiting and epigastric pain of at least three months' duration. (The case afforded another example of that remarkable association of tabetic arthropathy with gastric crises to which the author directed attention in February, 1880.[1]) It is suggested that many cases of so-called "gout in the stomach" may probably be examples of the gastric crises of tabes, as well as some which are supposed to be due to intestinal obstruction.

A like prominence of some other symptoms of tabes may equally absorb attention. Pierret's view that the disease is essentially a chronic inflammation of sensory fibres is adopted, and it is urged that, just as optic atrophy may be the dominating symptom in some cases, so atrophy of the auditory nerve may be the prominent one in others, and thus many cases of so-called "nervous deafness" may prove to be examples of tabes dorsalis. Reference is made to a case in which stone in the bladder was the first symptom of tabes dorsalis. The bladder-trouble may be more than usually pronounced, and lead to retention of urine and accumulation of mucus, in which a phosphatic calculus is easily formed. The urgent symptoms produced by this will easily conceal the general disorder which lies behind.

—

The Exciting Cause of Hysteria and Hystero-Epilepsy.

Dr. GRAILY HEWITT, of London, read a paper at the London Congress, the object of which was to demonstrate by the results of clinical observation that in cases of hysteria and so-called hystero-epilepsy the exciting cause of the attacks

[1] Cases of osseous and articular lesions in tabes dorsalis. Transactions of the Pathological Society of London, 1880.

is distortion of the uterus produced by flexion of the uterus upon itself either forwards or backwards.

The attacks are the result of reflex irritation, the irritation consisting in the physical compression and tension of the tissues of the uterus consequent on the forcible bending of the body of the uterus on the cervix. This bending has the effect of producing compression of the uterine tissues at and near the angle of flexion, and, by its interference with the circulation in the uterine tissues, it has the further effect of producing a continuous congestion of the body of the uterus.

The evidence offered by the author in support of the above explanation is the recital of eighteen cases observed by him during a period of ten years. In these cases, some of which were cases of severe attacks of hysteria, others identical with those described as cases of hystero-epilepsy, and a few in which the symptoms were of a less severe character, the condition of the uterus was carefully investigated.

Marked distortion of the uterus was present in all the cases, the most severe cases being those in which the uterine distortion was greatest.

Complete relief from the attacks and hysterical symptoms was obtained in these cases by a treatment directed to the removal of the uterine distortion. Out of eighteen cases perfect relief is known to have been obtained in seventeen; the subsequent history is not fully known in one case.

Of the eighteen cases related, twelve were cases of anteflexion of the uterus, and six were cases of retroflexion.

The complete cessation of the hysterical symptoms in the cases related, and the uniform success of treatment directed to the rectification of the shape and position of the uterus, conclusively show, in the author's opinion, that the exciting cause of the attacks was the flexed condition of the uterus.

On Infective Nephritis.

Prof. Bouchard, of Paris, read a paper at the late International Medical Congress at London, of which the following is an abstract:—

It is well known that albuminuria, generally transitory, occurs in the course of a large number of infective diseases. It is also known that in a certain number of these diseases, uræmic symptoms, and in several of them, the lesions of nephritis have been observed. It is known, then, that in infective diseases symptoms of a nephritis may supervene, which the autopsy confirms.

These kidney affections, occurring in infective diseases, are infective inflammations of the kidney, or Infective Nephritis. This is established by the following grounds:—

1. During life, the same infective agent which occurs in the blood, and the morbid fluids, is also found in the urine.

2. This infective agent is only found in urines which contain albumen, and elements which indicate a lesion of the kidney.

3. This infective agent disappears from the urine at the same time as the albumen disappears.

4. In fatal cases the same agents are found abundantly in the renal tissue.

5. Finally, in all the cases about which the above assertions are made, the kidney is found to present the anatomical characters of a nephritis.

Every case of albuminuria which occurs in an infective disease is not necessarily due to infective nephritis, or to nephritis of any kind. Albuminuria may be either thus produced, or may be dyscrasic. The albumen in these two kinds of albuminuria presents different physical characters. Infective nephritis, with the above characters, has been already ascertained to exist in fifteen infective diseases. Infective nephritis may be the starting point of chronic nephritis. The urine may be one of the means by which infective diseases are transmitted.

SURGERY.

Nature of the so-called Surgical Fever.

General attention was first directed by Sir James Paget, in 1864, to the peculiar liability of patients to be attacked with scarlet fever after operations. The fact has been confirmed by subsequent observations. Mr. HOWARD MARSH, in a paper read at the London Congress, presented a digest of the evidence bearing on this subject afforded by the Hospital for Sick Children, and by cases collected elsewhere; and the following points he relied on to prove that although instances are not rare in which eruptions unconnected with, though somewhat like, scarlet fever, are seen after operation, many of the cases are true scarlet fever.

The frequency of the cases at the Children's Hospital when scarlet fever was treated under the same roof with surgical cases; and the rarity of cases at the present time, when scarlet fever is admitted into a separate building.

That though when they are attacked patients are placed in the fever ward, they suffer no further contagion.

That though many cases are imperfectly marked, some are severe and even fatal, and fully typical of scarlet fever.

That the cases are more frequent during epidemics of scarlet fever than at other periods.

That cases have occurred in which, on very clear evidence as to the manner of infection, typical scarlet fever has been developed a very few hours after an operation had been performed.

Considering the disease to be true, though in many instances, modified, scarlet fever, the writer proceeds to examine the general question as to the manner in which scarlet fever, and other specific diseases, are liable to be modified by the circumstances under which they are developed. Reference is incidentally made to the point that scarlet fever appears to stand alone in its tendency to attack patients directly after operations.

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The Antiseptic Treatment in Abdominal Surgery.

In the course of a discussion in the Surgical Section of the London Congress on recent advances in the surgical treatment of intra-peritoneal tumours, some interesting remarks were elicited concerning antiseptic surgery.

Dr. KEITH stated (*Lancet*, Aug. 13, 1881) that the antiseptic method had many warm supporters, but after having a succession of eighty successful cases, he had five deaths in the next twenty-five cases, two from carbolic poisoning, and one from septicæmia, and two from acute nephritis. On account of this mortality, and of the very frequent high temperature the evening after the operation, he had abandoned the spray in all operations, and had had one death out of twenty-seven ovariotomies without the antiseptic treatment.

Prof. LISTER stated in reference to Dr. Keith's experience, that he had dissuaded him from using antiseptics in the first instance; in such an operation there is abundant room for effusion and means of absorption, while carbolic acid both increases the one and lessens the other; but on the whole he thought antiseptic ovariotomy had been successful. Referring to the experiments detailed at Cambridge which showed that diluted septic poison may be added without effect to blood serum, though not to diluted blood serum, he further recited more recent experiments which showed that blood-clot in the body is still less favourable to the development of organisms. He expressed his belief that it is "solid bits of dirt" that are the deleterious agents, and that possibly too much atten-

tion has been paid to the finest particles floating in the air. His own results, however, were so good that he shrank from giving up any one of the details of the treatment by which he obtained them, although he quite admitted that he too might at some future time be able to say "*fort mit dem spray*"; at present he could not accept irrigation as a substitute for the spray. He denied that there was any ground for the charge that he disregarded the general condition of the patient or his hygienic surroundings. Were this true, his results being so good as admitted by all, what a strong argument it afforded to the efficacy of his merely local treatment.

The *Lancet* says there was not time for Professor Lister to touch upon the many points raised by previous speakers. If we were to attempt to give in a few words the general impression produced by the debate, we should say that the value of antiseptics was clearly recognized by all, that it was made evident that Professor Lister's aim may be attained by means other and simpler than his; that in particular the value of the spray is considered very doubtful; but more than all, that antiseptic treatment only answers one of the requirements of wound treatment, and that he only is a scientific surgeon who enlarges his views and practice to embrace all.

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The Causes of Failure in Obtaining Primary Union in Operation Wounds.

Prof. G. M. Humphry, of Cambridge, discussed this important subject in a paper read at the London Congress. He considered the following points:—

1. The delicacy and sensitiveness of the tissues in infantile and early life, which renders them liable to inflammation and ulceration upon slight irritation.

2. The deficiency of the nutritive energy requisite for the healing processes in the atonic and aged, evinced most especially in the lower limbs, when there is disease of the arteries.

3. The presence of foreign substances in the wound, especially blood or bloody fluid, which separates the surfaces, and has, further, a tendency to decomposition.

Cut surfaces placed in apposition, and kept so, unite, unless there is some cause preventing union; witness wounds of the face, and other parts, in which there is little opportunity for the accumulation of fluid between the surfaces, and in which primary union usually takes place.

The methods most calculated to secure primary union are, therefore, those which maintain the apposition of the cut surfaces most effectually, and with least irritation, and which provide against the presence of blood or bloody fluid in the wound—sutures of such material, and applied in such manner as is least likely to cause irritation—quietude of the part, gentle, uniform pressure, and fixing on a splint where that can be done.

The effusion of blood into the wound after it has been stitched up is best prevented by carefully securing the vessels with ligature, or by torsion. Ligatures are easily applied, are almost unfailing, and are attended with little or no ill effect; the material of which they are made, together with the tissue included in them, undergoes absorption, so that it is immaterial how many are applied. The actual cautery may be used freely as an adjunct. The sponging of the wound will promote oozing at the time, and tends to lessen the risk of it afterwards. Insert drainage tube and express the blood from the wound as long as it continues to flow through the tube after the wound has been stitched up.

Antiseptics are an additional precaution, preventing the decomposition of any bloody fluid which, in spite of the above-named precautions, may be effused into the wound. They are especially valuable when cavities are opened.

Esmarch's band promotes bleeding from cut surfaces soon after its removal, but rather lessens the risk of subsequent effusion.

Some Observations on Wounds Inflicted by the Bullets of the Martini-Henry Rifle.

Mr. T. LONGMORE, Surgeon-General of the British Army, in some observations on this subject at the London Congress, said that in the summer of 1879, Dr. Kirker, R. N., brought to his notice some observations he had made experimentally on certain differences in the characters of wounds inflicted by spherical bullets, and those by conoidal bullets. These differences were quite reconcilable with the conditions of the experiments instituted, especially as regards the nature of the objects fired at, the relative dimensions and weights of the projectiles employed, and the distances at which the objects were hit by them.

One of the observations made by Dr. Kirker was, that, though bones penetrated by the conoidal bullets were extensively fissured, the periosteal investment of the fragments was not much disturbed; and Dr. Kirker was led to surmise that, in some instances, the cures without suppuration of fractures of bones caused by conoidal bullets, which had been attributed to special modes of treatment, might have been chiefly due to the fragments having been maintained in situ in the manner just mentioned.

That fractures of long bones by conoidal bullets are usually accompanied by extensive fissures, and that some of the fissured fragments are held in situ by the periosteum, are acknowledged facts; but that the maintenance of the fragments by their periosteal covering should occur so largely as to enable the wound to become healed without suppuration was new to Mr. Longmore.

It occurred to Mr. Longmore that it might be useful to carry out a few experiments with the hardened bullet of the Martini-Henry rifle in present use, for the purpose of comparing its effects with those of the bullet used by Dr. Kirker, as described by him, and also with the effects previously observed by himself of the Enfield rifle bullet. It was particularly as to the amount of local comminution of the bone, and the extent to which the fissured fragments were kept in situ by the periosteum, that he thought observations might be useful.

The results of these trials Mr. Longmore accordingly made were briefly as follows:—

1. The Martini-Henry bullet causes considerably more laceration and contusion of the soft tissues, with all comminution and displacement of bone at the site of impact, than were observed in the experiments described by Dr. Kirker.

2. The area of comminution is not so extensive, and generally the fragments are not so widely scattered, with the Martini-Henry bullet, as occurred in corresponding experiments made by Mr. Longmore with the Enfield rifle bullet, .55 inch in diameter, of soft lead.

3. A larger proportion of displaced fragments at the part of the bone struck by the Martini-Henry projectile, retain their periosteal connection than when the Enfield rifle bullet was used; while long fragments, above and below the site of impact, though detached by fissuring from the adjoining bone surfaces, are maintained in close apposition by the periosteal investment.

4. It was noticed, in one experiment, that though fissures extended completely through the apophysis of the bone, the synovial membrane, covering the joint surface, remained intact. The fissures extended to the joint, but the joint was not opened.

Conclusions: The state of the bone wounded by the hardened Martini-Henry projectile appears to offer more opportunities of repair than if the fracture had been caused by an Enfield rifle soft leaden bullet.

When the grave importance of the long fissured fragments being retained in juxtaposition, and in their normal relation to the shaft of the fractured bone is

remembered, and the further importance of the periosteum covering them being kept intact; these experiments point very strongly to the urgent necessity of *immobilizing* such fractures from the onset.

The special importance of immobilizing gunshot fractures, which are supposed to be accompanied with fissures extending into a neighbouring joint, is also rendered very manifest: for in any case where the extremity of the bone is split, but the synovial capsule of the articulation happens to be still complete, it is obvious that a small amount of rough movement may cause the synovial membrane to be torn along the line of fissure in the bone, and a communication to be established between the seat of fracture and the interior of the joint. The gravity of the injury would be very largely increased should this happen.

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Removal of the Entire Tongue with Scissors through the Mouth.

Mr. Walter Whitehead, Surgeon to the Manchester Royal Infirmary, on November 3, 1877, removed the whole of the tongue through the mouth with scissors (*vide Brit. Med. Journ.*, December 8, 1877, p. 303) which is believed to be the first instance of the entire tongue having been removed for disease through the mouth by simple excision. More than thirty tongues have since been removed by the same plan. In a paper presented to the London Congress Mr. Whitehead made a study of these cases. The operation is conducted in six stages after the following simple manner: 1. The mouth is opened to the full extent with a suitable gag; and the duty of attending to this is entrusted to one of the two assistants required. 2. The tongue is drawn out of the mouth by a double ligature passed through its substance an inch from the tip. 3. The operator commences by dividing all the attachments of the tongue to the jaw and to the pillars of the fauces. 4. The muscles attached to the base of the tongue are then cut across by a series of successive short snips of the scissors until the entire tongue is separated on the plane of the inferior border of the lower jaw, and as far back as the safety of the epiglottis will permit. 5. The lingual or any other arteries requiring torsion are twisted as divided. 6. A single loop of silk is passed by a long needle through the remains of the glosso-epiglottidean fold of mucous membrane, as a means of drawing forwards the floor of the mouth should secondary hemorrhage take place.

The patient is fed for the first three days by nutritive enemata; satisfying thirst by occasionally washing out the mouth with a weak iced solution of permanganate of potash. The difficulties and dangers of the operation are few. Hemorrhage is easily controllable. I have twice removed the entire tongue without having to secure a single vessel, and more than once have only had to twist one lingual artery.

A table of twenty-eight cases, with one death the immediate result of the operation (an old man æt. 69) accompanies the paper. Two other deaths occurred in consequence of the operation, but from remote causes.

Taking the most unfavourable estimate, the deaths in the twenty-eight cases do not amount to 11 per cent., and, when contrasted with the 30 to 60 per cent. of deaths resulting from removal of the tongue by any other operation, I venture to affirm that substantial evidence has been submitted in favour of the removal of the tongue with scissors.

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Indications for Extra- or Intra-Laryngeal Treatment of Growths in the Larynx.

Curious difference of opinion between surgeons and laryngologists exists on this question, and there is considerable difficulty in giving, at the present time, final and accurately determined indications for certain doubtful categories.

Prof. BUROW, of Königsberg, at the London Congress laid down the following propositions on this subject.

Every benign laryngeal tumour ought, if possible, to be removed per vias naturales; and only if an experienced laryngologist has established the inexpediency of this method may the extra-laryngeal be adopted. Of this the following forms are to be considered; Thyrotomy, total and partial; opening of the crico-thyroid ligament, and sub-hyoid pharyngotomy.

Total thyrotomy is an operation more endangering life than is commonly supposed. Percentage of mortality augmented by four per cent. by communication of bad results, obtained by others and the author.

Thyrotomy protects as little against recurrence as does the endo-laryngeal method (in papillomatous disease). *It endangers*, to a high degree, the subsequent *re-establishment of the function of the organ* by injury to the vocal cords, cicatricial contraction, etc. *The facilitation of the removal of the tumour is by no means so great* as one might believe *à priori*, in consequence of insufficient separation of the alæ of the thyroid cartilage, hemorrhage, great sensibility, etc.

Partial thyrotomy is entirely to be repudiated, on account of the insufficient space obtained by it.

Also, as to comparative *quickness of cure*, thyrotomy is not superior to endo-laryngeal method, as the former confines the patients to bed and house, whilst the latter permits them to follow their occupation.

Certain qualities of growths, supposed by many to be sufficient indications per se for the adoption of extra-laryngeal method are, as a rule, only so, if they occur, not separately but several of them together. Such are broad bases, unusual hardness of consistency, origin in the ventricles, great size, multiplicity (in papillomata), even situation beneath the glottis. In the majority of cases these difficulties can be overcome by sufficient persistence and employment of suitable instruments, and especially of the galvano-cautery. In proper cases *the division of the crico-thyroid ligament is much to be recommended*—an operation which is much too rarely performed at the present time, especially in sub-glottic tumours, but which is suitable also in polypi originating from the free border, or from the upper surface of the vocal cord, if they have a long and movable pedicle. *Sub-hyoid pharyngotomy gives a good means of approach to tumours of the upper laryngeal cavity*, especially to those originating from the epiglottis. In children, the tumours most frequently found are papillomata; here neither method can boast of very good results. *One should always try the endo-laryngeal method in children also;* if this be impracticable, one should tracheotomize children from 6 to 8 years old, if dyspnœa be present, and try to operate one or two years later *per vias naturales*. In infants thyrotomy is to be practised, tracheotomy having been previously performed.

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Recent Advances in Abdominal Surgery.

Mr. LAWSON TAIT drew the attention of the London Congress to certain advances in abdominal surgery, which he regards as the outcome of the increase in the success of ovariotomy, which he attributes to increased attention to hygiene and to the intraperitoneal method of operating.

He has, in papers already published, laid down the principle that every clearly non-malignant tumour of the abdomen or pelvis, which presents a likelihood of destroying the patient, or which, by reason of suffering caused by it, greatly interferes with the comfort of life, should be investigated by an exploratory incision. Acting upon this, he has opened the abdomen in many cases which until recently were not regarded as within the province of surgical effort. Amongst these were included one case of gallstone, five cases of hydatids of the liver, one case of large

cyst of the liver, six cases of cysts of the kidneys, one case of abscess of the spleen, twelve cases of abscess of the pelvis, four cases of suppuration of the Fallopian tube, and six cases of Fallopian pregnancy. Of these thirty-six cases only one died, that being a case of Fallopian pregnancy, in which the child is still living, the mother being at the time of the operation too far exhausted for recovery to be hoped for.

The principles of the operations in such cases were: First, to operate before the patient was hopelessly exhausted; secondly, to open the abdomen carefully in the middle line; thirdly, to take the utmost care that none of the contents of the cavities attacked should be allowed to enter the peritoneal cavity; fourthly, to completely close the peritoneal cavity under all circumstances, that being done by uniting the wound in the tumour by a continuous suture to the wound in the abdominal wall when it was necessary to drain the cavity; fifthly, scrupulous attention to the proper isolation of the patient from all insanitary and poisonous influences. The author has in a few of these cases attempted to employ the Listerian details, but he found them cumbrous and impracticable, and that the patients recovered perfectly well without them, and that the employment of carbolic acid rather impeded recovery than aided it.

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Extirpation of the Kidney.

Prof. CZERNY, in a paper read before the International Congress at London, presented the following conclusions:—

1. Extirpation of one kidney is indicated in cases of wound of the kidney, floating kidney, pyonephrosis, calculous pyelitis, cysts, and hydro-nephorosis, tumours, and fistulæ communicating with the ureter; as soon as the life of the individual is endangered, and other methods of treatment prove ineffectual, provided that the other kidney is sound.

2. Nephrectomy can be performed, by an abdominal section which involves opening the peritoneum, or by means of a lumbar incision which leaves the peritoneum intact. The first method is suitable for cases of movable kidney; the other is indicated when the kidney is quite fixed, or nearly so.

3. The lumbar incision is the safer of the two plans, and therefore is worthy of further development.

4. The best method of dealing with the pedicle is to carefully ligature it, and cut it short, adopting antiseptic precautions.

5. Incision of cyst and stitching its margin to the skin is the best plan of treatment in cases of fixed hydro-nephroses, empyema of the pelvis of the kidney, and echinococcus of the kidney.

6. The plan of catheterizing the ureters of women and constricting the ureters of men, in order to confirm the diagnosis of disease affecting one kidney only, has not been sufficiently practised, and deserves a wider employment, aided, perhaps, by the use of the endoscope at the same time.

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Nephrectomy for Nephrolithiasis.

Mr. BARWELL reported at the London Congress the following interesting case:—

Dennis F——, aged eighteen, was under my care, October, 1880, with a left lumbar abscess, diagnosed as perinephritic, probably depending on calculus. The abscess was widely opened. He improved in health. No leave for further measures was obtained. He was discharged in January, 1881, but kept under observation.

1881. *March* 29. The lad was readmitted, having suffered more, and lost flesh considerably. His temperature was very hectic. In April Mr. Barwell sounded through the persistent sinus, and detected a stone.

May 5. Leave for further procedure was obtained. The difficulties foreseen were from proximity of twelfth rib to the crest of the ilium, and from amount of dense cicatricial tissue. Patient, when etherized, was laid across a thick sand-bag, so as to bend spine forwards and to the right. Mr. B. made the usual oblique incision, but the scar-tissue so obscured parts he could not trust them as guides to the kidney. He followed the sinus with his finger, detected the stone, and, passing the knife along the digit, laid the gland bare, obtaining more room by running the scalpel along lower border of last rib. An attempt to remove the stone failed, but produced some bleeding, restrained by pressure, while he quickly enucleated the hard body enough to pass a silk ligature over it, and tie it near its calyx; bleeding being thus checked, the rest was more carefully peeled away, until he could feel the pedicle isolated and distinct. A second cord was passed in the same way in front of the kidney, and tied round the pedicle *en masse*. There was not room to remove the organ entire. He cut it in two with scissors in the depth of the wound, severed each portion from the tied stalk, and removed them separately.

The boy's temperature after the first night steadily improved. A good deal of albumen was in the urine at first; but regulation of diet has cured this condition. A piece of sloughed ureter 4½ inches long, with the ligatures attached, came away on the forty-sixth day.

June 22. The boy is well in health. Has gained flesh. Temperature normal. Only a minute wound remains.

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Partial Excision of the Bladder.

Dr. ADOLPH FISCHER, of Buda Pesth, presented a paper on this subject at the London Congress, which embraced the results of some interesting experimental observations. In order to answer on the ground of practical experience the following questions, he has excised larger or smaller portions from the bladder of seven dogs.

1. Is it necessary in operating on dogs to take strict antiseptic precautions?
2. Is the operation attended by great dangers, and has the wound of the bladder, if properly stitched, a tendency to heal?
3. Which material, and which kind of suture is the most suitable?

Four of the seven dogs recovered.

The first two were operated upon antiseptically; one died. *Post-mortem.*—Sutures not accurate; peritonitis.

The second two not strictly antiseptically; one died on the third day with a high temperature. *Post-mortem.*—Hemorrhage into the peritoneal cavity.

Three dogs operated upon not antiseptically at all; one died. In the fatal case Dr. Fischer had excised a considerable part from the trigonum vesicæ. *Post-mortem.*—Gangrene of the bladder.

The material for sutures was Lister's antiseptic silk, silk boiled in five per cent. carbolic lotion, and catgut. Each of these materials answered well. Dr. Fischer used the interrupted and the combined suture, and a modification of my own, the combined interrupted suture.

From these experiments the following deductions may be drawn:—

1. In operating on dogs antiseptic precautions are not absolutely necessary.
2. Wounds in the bladder, which are afterwards carefully united by sutures, are not particularly dangerous.
3. Good results are principally dependent upon the accuracy of the suture.

There can be no doubt that this operation is more likely to be successful on the human subject, because it can be done antiseptically; the bladder can be subjected to a mechanical treatment (irrigation with antiseptic fluids); a catheter can be kept in the bladder, and absolute rest can be secured.

The indications for partial excision of the human bladder may be brought at present under the following heads:—

1. Traumatic injuries to the bladder with contused edges.
2. Diverticula of the bladder, containing encysted calculi.
3. General dilatation of the bladder, when the cause of the disease has either been removed or is removable.
4. Benign and malignant tumours involving the wall of the bladder.
5. Vesico-abdominal, vesico-vaginal, and recto-vesical fistula.
6. Destructive ulcerations threatening rupture, and withstanding other methods of treatment.

Treatment of Scrofulous Inflammation of Joints.

Prof. HUETER read a paper at the London Congress on this subject, of which the following is an abstract:—

1. Scrofulous inflammation of a joint is characterized by the formation of granulation tissue, so that suppuration follows,—while in other forms of joint inflammation, especially the traumatic form, suppuration precedes, this formation of granulation tissue.

2. Scrofulous inflammation can be described as leading to the formation of granulations, as a synovitis granulosa, if it proceeds from the synovial membrane; as a myelitis granulosa, if granulation masses are previously formed in the medullary substance of the bones (of the joint). In the latter case, the synovitis granulosa follows the myelitis granulosa.

3. In the scrofulous granulations, "noxæ" develop themselves, which, at the seat of the primary disease, lead to the formation of tubercles (local tuberculosis of joints), and by getting into the bloodvessels, produce general tuberculosis (lungs, and other organs).

4. This form of joint-inflammation may, therefore, be called the scrofulo-tubercular.

5. That form of joint-inflammation, which is produced by congenital syphilis, shows similar appearances; it must, nevertheless, be differentiated, both for diagnostic and prognostic purposes, since there are no "noxæ" which can lead to tuberculosis.

6. The early stage of scrofulous inflammation may be successfully treated by the injection of a 3–5 per cent. solution of carbolic acid. The injection must be made with a Pravaz syringe, in such a way that the solution comes in immediate contact with the granulation tissue, *i. e.*, with the interior of the joint, if the case is one of synovitis granulosa, and with the interior of the bone, if it be one of myelitis granulosa.

7. Antiphlogistic treatment of scrofulous joints (fixation, massage, compression, permanent extension, blood-letting, blistering), is of little or no value.

8. Incision into the joints, drainage, scraping away the granulations, or partial venesection of a joint, are to be discarded.

9. Carbolic injections having failed, excision is the best treatment, especially after suppuration has set in.

10 and 11. Excision should be total. When practised early, the results are the most satisfactory.

12. Scrofulous manifestations (local) after excision, are best treated by the application of the actual cautery, and the dusting on of iodoform; or by the introduction of iodoform crayons into the fistulous openings.

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On the Results of the Treatment in Chronic Diseases of the Knee-Joint, including an Account of Fifty Resections of the Joint.

Prof. KOCHER, of Berne, was the author of a paper presented at the London Congress, which contained the following practical conclusions:—

1. Amputation of the thigh is indicated in cases where white swelling occurs in patients suffering from tuberculosis of the internal organs, or those whom the disease has rendered very anæmic, or who present a constant high temperature, or are reduced by prolonged suppuration.

2. Resection is the best treatment in all other cases, if contraction of the joint or considerable functional disturbance have occurred.

3. Under these circumstances resection gives in every way better results than are obtained from conservative treatment.

4. Resection should be only resorted to in exceptional cases in childhood or advanced age. The results are as good or better as regards union of the ends of the bones in adult life than in childhood.

5. The mortality since the author commenced the practice of resection has only been 12 per cent.; and now, thanks to the recent improvements and the introduction of antiseptics, the operation has become free from danger.

6. His present endeavour is so to improve the method, that movable, and at the same time firm, joints may be secured.

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On the Treatment of Aneurism by Esmarch's Elastic Bandage.

Mr. EDWARD BELLAMY, Surgeon to the Charing-Cross Hospital, London, presented a note on this subject to the London Congress. From the consideration of four cases under his care, in three of which the bandage had utterly failed, he considers those in which the aneurism is of rapid development, and the sac is highly compressible, and where there are decided heart complications, as quite unamenable to the bandage pressure treatment.

In three of the cases alluded to, all of popliteal aneurism, and one of very recent standing, the aneurismal sac became evidently rapidly expanded during treatment, and thinned, and threatened giving way; faintness came on after the pressure had been applied but a short time. They all recovered rapidly after ligature of the superficial femoral.

The fourth case, also of popliteal aneurism, in which the use of Esmarch's bandage succeeded, was of a very different type; the walls were hard, and but slightly compressible, with but little distension, and, most probably, cure had already commenced before the treatment was undertaken. There were no heart symptoms, and the aneurism was of long standing.

The evidence, it must be granted, from these four cases, is negative.

A fifth case under the author's care, of carotid aneurism, was treated partially successfully by digital pressure and Esmarch's bandage; but he is inclined to consider the good done to be entirely due to the digital element.

The method would seem to be effective in cases of equable expansion, and commencing spontaneous cure by fibrinous deposit, by causing the further approximation of the inner wall of the sac and its contents.

The "Modus Operandi" of Esmarch's Elastic Bandage in the Treatment of Aneurism.

Mr. A. Pearce Gould, Assistant-Surgeon to Westminster Hospital, London, read a paper on this subject, of which the following is a summary, at the late London Congress:—

1. It is first pointed out that while other methods of treatment—Ligature, Instrumental and Digital Compression, Flexion—lessen or entirely stop the flow of blood through part or parts of the main blood-channel, they do not interfere with the blood-current in secondary vessels, or control the anastomotic circulation. Esmarch's Elastic Bandage, on the other hand, when firmly applied, stops the circulation in all the vessels of the part.

2. It is next shown that the cure of an aneurism is brought about by the obliteration of its cavity, either by fibrin, or by clotted blood, and subsequent organization of the same.

3. The conditions leading to the deposit of fibrin are discussed, the main condition being shown to be contact of moving blood with foreign bodies, while a consideration of the mode of formation of bloodclot in the living body shows it to be especially dependent upon the circulation of destructive or coagulating substances, and the contact of foreign or unhealthy matter with blood in a state of rest.

4. The vital properties of fibrin and bloodclot are next compared, and particular stress is laid upon the facts that fibrin is very stable, and resists the processes of organization and absorption, while bloodclot is very unstable, and may be readily absorbed or organized; the conditions determining these changes are referred to.

5. From these premises it is deduced that Esmarch's Bandage, so applied as to stop all circulation, does not cause a deposit of fibrin, but may cause a coagulation of the blood *en masse*.

6. The fact that this coagulum may be absorbed, broken down, or organized, the conditions leading to these changes, and their results, are then stated.

7. From these considerations certain deductions are drawn as to the cases of aneurism in which this method of treatment is likely to give the best results, and to those in which it is likely to fail. The value of preparatory treatment is insisted upon.

The pathological and clinical evidence bearing upon and supporting these views was detailed by Mr. Gould.

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Treatment of Injuries of Bloodvessels in the Field.

Dr. F. Esmarch, Professor of Surgery in the University of Kiel, read an elaborate paper on this subject at the London Congress, from which the following is an abstract:—

1. The indications in the treatment of injuries of the larger arterial trunks, and of traumatic hemorrhage, have been considerably simplified by the introduction of "antiseptics," and of Esmarch's bandage.

2. The practice, formerly in use, of ligaturing arteries above the wound is uncertain, and ought, therefore, to be entirely discarded.

3. The application of styptics is equally objectionable, not only because of their uncertain action, but because they foul a wound, and interfere with its healing.

4. In all cases of hemorrhage, threatening life, the wounded vessel must, if possible, be exposed at the seat of injury, and ligatured above and below this point, either with catgut or antisepticised silk.

5. This operation must be carried out under the most rigid antiseptic precau-

tions; if on the extremities, an Esmarch's bandage must be applied. As it is necessary in all such cases to disinfect the wound, even to its innermost recesses, the disinfection and the operation can be done at the same time.

6. The most effectual method to render such operations easy, rapid, and thorough, is to make a free incision parallel with the axis of the limb. When life is at stake, it matters little whether such an incision is one inch or one foot in length, provided that the hemorrhage is arrested, and that the wound is kept sweet; the large wound heals just as well as the small one.

7. After freely incising the skin, the operator inserts his left index finger deep into the wound, and, with a button-pointed bistoury, opens up, just as freely, the deeper layers of connective tissue, fasciæ, and muscles, while an assistant now separates the parts with retractors.

8. The blood-clot, which is generally found to fill the wound, and to have infiltrated the surrounding cellular tissue, is now rapidly turned out, either with the fingers, or sponges, or raspatories, partly because it hides everything, and partly to avoid subsequent decomposition. It is only under these circumstances that any operation can be carried out with anything like exactitude.

9. As soon as this is done, the operator feels with his finger for the vascular and nerve trunks, and endeavours, with the aid of a clean sponge, to learn the exact nature of the injury.

10. When the large veins are empty and collapsed, it is sometimes difficult to distinguish them from strands of connective tissue. On this account it is advisable to provide a little reserve of blood, which may be done in this manner: For the arm, a cord might be fastened round the wrist below the wound, before the elastic (Esmarch) bandage was applied; then, on loosening this and raising the arm, the blood shut up in the hand would, if the vein was injured, flow into the wound, and would so make it manifest.

11. As soon as the injured spot of the artery or vein has been laid bare, so that its full extent can be clearly seen, the vessel must be isolated and then securely ligatured, either with catgut or carbolized silk, above and below the injury. If the continuity of the vessel has not already been destroyed by the injury, the vessel must be cut between the two ligatures. The operator should convince himself that no lateral or deep branches are given off to the injured part of the trunk. Should any small branches be found they ought to be carefully isolated, ligatured, and then separated from the parent trunk.

12. The Esmarch bandage should now be removed, and all bleeding vessels carefully tied, the limbs being raised, as after amputations.

13. Should any nerve trunks or tendons have been divided, their extremities must be sought for and sewn together either with fine catgut or carbolized silk.

14. Any foreign bodies (bullets, bits of bone, or fragments of clothes) which may be found should be removed.

15. The whole wound must now be thoroughly disinfected, either by irrigation, or rubbing in chloride of zinc, or strong carbolic solution, taking care that the fluid gets into every little recess.

16. After counter openings have been made in suitable places, and drainage tubes put in, the wound must be closed with antiseptic sutures, and finally the antiseptic compressive-dressing applied.

17. This operation can hardly be carried out on the battle-field, or in a first field-hospital, because it requires both time and care, and because the necessary antiseptic precautions are only to be had in a thoroughly well-organized lazaretto (hospital).

18. The elastic bandage can alone be recommended for the provisional arrest of hemorrhage on the battle-field.

19. The use of styptics is very objectionable; all such remedies ought therefore to be banished from the surgeon's field-case.

20. The application of tourniquets, formerly so much in vogue, is likewise to be deprecated as uncertain and dangerous, not only because their application requires precise anatomical knowledge, but, and chiefly because, however accurately the pad may be adjusted, it is almost sure to slip aside during transport; the binder then interferes not only with arterial but also with the venous circulation. As a necessary consequence either the hemorrhage recurs, or, if an external wound is closed, dangerous blood infiltration of the limb takes place.

21. An effectual and permanent compression of the vessels can be secured by means of an elastic tube, applied, while extended, two or three times round the limb. The soft structures are in this way compressed on all sides, and the circulation is entirely arrested.

22. As this compression is efficient to whichever part of the limb it is applied, no anatomical knowledge is necessary. It is in no way interfered with by transport, and it cannot slip if the extremities of the tube are carefully fastened.

23. On this account all tourniquets should be removed from the armamentaria of field hospitals, and be replaced by elastic tubes.

24. Every wounded man, on whom hemorrhage has been provisionally arrested by an elastic tube, ought of course to be removed as rapidly as possible to a hospital, in order that the compression may be removed, and the ligature of the wounded vessel immediately undertaken.

25. It is very advantageous, before putting on the elastic tube, to apply a bandage to the limb while in a raised position. If the bone is fractured, a fixative bandage of some kind ought to be applied for transport.

OPHTHALMOLOGY AND OTOLOGY.

Operations to be Employed in the Various Forms of Glaucoma.

Dr. De Wecker, of Paris, read a paper on this subject at the London Congress, of which the following is an abstract:—

The most enthusiastic supporters of iridectomy in glaucoma must admit that there are cases in which this operation is ineffective, or even injurious. This admission, made even by Von Graefe himself, justifies the zeal with which new methods of operative treatment have been sought after, aided by the use of myotics.

Sclerotomy, which has now definitely established for itself a position in eye surgery, has filled up the gap left by the insufficiency of the iridectomy operation.

It is important to every observer to know what part iridectomy and sclerotomy play in the cure of glaucoma, in order to give in each case the greatest possible chance of permanent cure.

Sclerotomy will be eagerly resorted to in those cases in which iridectomy is known to be dangerous—viz., in glaucoma hæmorrhagicum, or in glaucoma congenitale, or glaucoma infantile, otherwise known as buphthalmic hydrophthalmia. Also where iridectomy is unreliable—that is to say, according to Von Graefe's own admission, in simple chronic glaucoma, with the absence of any inflammatory symptoms. Also in those cases where the visual field has contracted nearly to the point of fixation, it is unsafe to remove any iris. And prolonged experience satisfies the author still more that the scleral incision alone is the best, most complete, and safest in simple chronic glaucoma.

Shall we, then, say that all glaucomas, not amenable to iridectomy, are curable

by sclerotomy? Unfortunately, no; for exceptional cases occur in which repeated sclerotomies, as well as subsequent iridectomy, are ineffective.

Experience has taught us that a glaucoma simplex, which has resisted sclerotomy, is not to be cured by an iridectomy. We get the most striking results from iridectomy in acute glaucoma; and we can go so far as to say that the more acute the glaucoma, the more successful the operation is likely to be.

Although in acute glaucoma we obtain as good results with sclerotomy, the difficulty in its execution, and the absence of any superiority in its remedial effects, are reasons which keep us from preferring it to an operation, which, even when moderately executed, still yields excellent results.

An operation requiring a very delicate and exact procedure will hardly manage to supplant another more easy, and requiring less rigorously-exact execution, if the superiority of the first is limited to some optical and cosmetical advantages.

Another reason rendering sclerotomy less applicable is, that it is indispensable for its success that there should be a perfect contraction of the pupil under myotics, which forms the only guarantee against entanglement of the iris in the wound.

This security is afforded in all cases which myotics have transformed into simple chronic glaucoma, as well as in all those which have from their outset presented this character. Sclerotomy offers, in these all the advantages afforded by iridectomy in the acute and irritative form.

An excellent indication, for choice between the two operations, consists in the more or less complete action of myotics.

Thus sclerotomy is indicated:—

1. In (all forms of) hemorrhagic glaucoma (and in those suspected of belonging to this category).
2. In (all cases of) glaucoma congenitale (buphthalmia).
3. In (all cases of) chronic simple glaucoma.
4. Whenever after an iridectomy the vision has deteriorated, or when the good result of this operation begins after a period to diminish.
5. In combating the prodromata of glaucoma.
6. In all cases of glaucoma absolutum, with complete atrophy of iris, and attacks of pain.

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Nature of Sympathetic Ophthalmitis and the Mode of its Transmission.

Prof. H. SNELLEN, of Utrecht, presented a paper on this subject, at the London Congress, in which he maintained that: 1. The explanation of sympathetic ophthalmitis as a reflex action of the ciliary nerves is insufficient.

2. As a clue to further research, the hypothesis recommends itself that sympathetic ophthalmitis is to be regarded as a metastatic specific inflammation, in which special parasitical inflammatory elements are conveyed over to the choroid of the sympathizing eye through the dilated lymph-paths.

Mr. W. A. BRAILEY, of London, maintained that the uveitis, which is so strikingly manifest in the well-marked and severe cases of this disease, presents certain definite pathological characters by which it can be distinguished histologically from other forms of inflammation.

These characters, though they differ a little at different parts of the uveal tract, are nearly always recognizable in both eyes.

Though in the sympathizing eye the disease often, as is well known, begins as an iritis serosa, with accompanying keratitis punctata, yet here also the peculiar characters of sympathetic ophthalmitis usually become visible at a later stage.

The disease is not transmitted from one eye to the other, by the passage of structural change along either optic or ciliary nerves.

Relation between Optic Neuritis and Intracranial Disease.

Prof. TH. LEBER, of Göttingen, in some remarks which he made at the London Congress, stated that in his opinion optic neuritis in cerebral diseases is a true inflammation, and is not essentially different from other forms of papillo-retinitis, either in the character of the vascular congestion, or in the nature of the histological changes. It is, on the other hand, very different from the hyperæmia caused by venous stasis and the lesions which depend on it. This inflammation is not caused by stasis in the retinal veins from compression of the cavernous sinus, due to diminished intra-cranial space. It is not the result of irritation of vasomotor nerves, caused by the cerebral affection. It is the optic nerve which is the path of communication between the affection of the brain and that of the eye. An essential part in this transmission is taken by the effusion of a serous fluid into the sheath of the nerve extruded from the cranium by the increased intracranial pressure. This fluid does not act by simple mechanical pressure, since its quantity is sometimes small; probably it possesses phlogogenic properties.

Intracranial tumours act as a sort of foreign bodies provoking inflammatory congestions, and hypersecretion of fluid (internal hydrocephalus). The same effusions are found in meningitis when it is followed by papillitis. The origin of papillo-retinitis in cerebral diseases may, then, be explained by assuming that the intracranial inflammation produces serous effusion, which passes into the optic sheath, and exerts an irritating action on the papilla and neighbouring parts of the eye.

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The Pathogenesis and Etiology of Nystagmus of Miners.

Dr. NIEDEN, of Bochum, at the London Congress, read a paper which had for its object to determine:—

1. The percentage of the affection.
2. Its cause.

7054 individuals were examined at the pit's mouth, while going to or returning from their work. Among these 296 (4.2 per cent.) cases occurred. Of 1808 who were examined on their way to work, there were 62 (3.4 per cent., while, of 1746 returning, the number was 52 (3 per cent.). Out of 3017 miners who came under treatment for various forms of eye disease, nystagmus occurred in 172 = 5.6 per cent. Out of a total number of 29,640 persons of all sorts treated for eye affections, the percentage was .55.

Nystagmus occurs only in certain pits, that is to say, in those where the illumination is defective, and especially where the safety lamp is in use. Out of 117 cases encountered within the last two years, 107 (91 per cent.) had worked with this lamp. But where the naked light was in use the cases occurred only sporadically. It is important to notice the frequency of concurrent eye affections, which are met with in 38 per cent. of the cases. Also, of general disorders, which are found in about 45 per cent.

Nystagmus of miners occurs in the mining districts of Westphalia as a general nervous disease in from 4.2 to 8 per cent. of those employed. It consists, not in a muscular spasm, but in a defective innervation, like the tremor of old persons. It is occasionally brought on by working with insufficient light, also by general constitutional conditions. A probable means of preventing this disease would be to double or treble the illuminating power of the lamps in use.

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A New Operation for the Cure of Ptosis.

Dr. HERMANN PAGENSTECHER, of Wiesbaden, in calling the attention of the London Congress to the operation which he has devised, stated that all the ope-

rations at present employed for the cure of ptosis are unsatisfactory, sometimes producing too great, and sometimes too little result.

It is necessary, in order to obtain perfect movement of the upper lid, to continue the action of the musculus frontalis to this lid itself. This can be achieved by making a scar do the work of a tendon to the frontalis, by which means the upper lid is compelled to follow the movements of that muscle. The simplest way of doing this is to introduce a thick suture above the superciliary ridge, bringing it out at the margin of the lid, and to tie the ends together, leaving it gradually to cut its way out. It is possible also to apply the suture subcutaneously, thus avoiding all disfigurement by scars.

The cicatrix thus formed, acts as a tendon to the frontalis, raises the upper lid, and does not prevent its closure.

Many cases have already been operated on by the author with the happiest results.

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Action of Foreign Bodies introduced into the Interior of the Eyeball.

Prof. TH. LEBER, of Göttingen, in a paper on this subject, read at the London Congress, maintained that: 1. Foreign bodies which are clean, and which exert no chemical action, do not cause any inflammation in the interior of the eye.

2. Clean fragments of oxidizable metals—*e. g.*, iron, steel, copper—do not cause purulent inflammation, but many other phenomena which seriously compromise the functions of the eye, especially contraction of the vitreous and detachment and atrophy of the retina.

3. The entrance of metallic fragments into the interior of the human eye is usually followed by purulent inflammation, just as in experiments made without antiseptic precautions upon animals. This inflammation is always due to the action of germs which have entered through the wound.

4. Certain chemical substances—*e. g.*, arsenic, binoxide of mercury, croton oil, etc.—when introduced into the interior of the eye are capable of setting up purulent inflammation, which is quite independent of the action of germs.

5. The extract of septic liquids, in which the germs have been killed by boiling, set up a transient inflammation when injected into the anterior chamber or into the corneal tissue. These experiments favour the hypothesis that the phlogogenic action of the germs depends on the production of chemical substances which act on the vessels.

6. Cysticerci may also set up purulent inflammation in the eyeball, due perhaps to an irritating secretion from these entozoa.

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A New Method of Examining and Numerically Expressing the Colour Perception.

Dr. OLE BULL, of Christiania, at the London Congress, explained his method, which is based on producing the four principal colours of an equal intensity and shade.

From among the different hues of these colours the author has, for blue, chosen that which mixed with uncoloured light appears blue or colourless. A yellow, complementary to this blue, and of a like shade and intensity, is then produced. A red and a green have been chosen, which at the periphery of the retina appear either of their real colours, or colourless. Such a hue of this red and green is then chosen as to give, when mixed in equal parts, an indifferent gray, of the same shade as that given by the mixture of blue and yellow above referred to.

From these four colours, six fainter tints are derived by mixing up on Maxwell's disk, the single colour with uncoloured (gray) light of the same shade as

that given by each pair of the two complementary colours mixed together. The relative intensity of these tints can be expressed by indicating the number of the degrees of the coloured sector, namely, 40°, 60°, 80°, 120°, 160°, 240°. These tints are fixed by imitating them with pigment, and then—together with the four principal colours—painted on a black plate in squares.

A patient's colour-sense may be examined by this plate simply by pointing out any coloured or uncoloured square, and then asking him to indicate that square which appears most like it. If he is colour-blind, he will make mistakes. If his colour-sense is diminished by disease, both the kind and the degree of the defect may be detected. As the healthy eye at a distance of one metre from the plate can just discern the faintest tint—40°—a colour-sense corresponding to this is taken as normal. If, *e. g.*, a patient can discern red only up to 80°, and green to 120°, he is beginning to turn green-red-blind, and his perception of these colours may be expressed for the red by $\frac{40}{80}$° and for the green by $\frac{40}{120}$°.

MIDWIFERY AND GYNÆCOLOGY.

Antisepsis in Midwifery.

Prof. Spiegelberg, of Breslau, in a communication forwarded to the London Congress, said that the great reform in surgery brought about by the antiseptic treatment could not fail to have a deep influence upon the treatment of the complications in childbed, as it was well known long ago that the latter are the same which arise from wounds. If, however, scrupulous cleanliness, which had been advocated long ago, favoured a normal course of the puerperium, the practical gain was not very great.

The idea that the puerperal wounds are infected, and the inflammation of the genital organs are initiated by germs coming from outside, became more in vogue, and the idea that phlogogenous matter might be produced spontaneously within the genital tract, was almost abandoned. The consequence of this idea was recommending the most scrupulous cleanliness of hands and instruments; forbidding practitioners engaged in midwifery to attend other patients; forbidding students engaged in dissecting to attend midwifery cases; forbidding nurses attending cases of puerperal fever to attend normal cases at the same time.

The experience that all these measures reduced the number of bad cases only little originated the idea of secondary antisepsis. Intra-uterine irrigations and drainage came in use, but without much avail; the opinion took root that there was no identity between wound and childbed complications—that there existed an essential puerperal process.

These failures can be made comprehensible by laying clearly open the development of infection; and here, too, is it necessary to refer to the history of the antiseptic surgery.

The theory and practice of Lister's system is founded upon the view now sufficiently justified by experience, that infection is brought about by the action of germs which float about in the surroundings of the patient, and which fall on the recently-made wound. It is, therefore, absolutely necessary to clean the surroundings from the germs; if that is not practicable, to destroy the efficiency of these germs while the wound is open, and by keeping subsequently the wound closed. The application of these rules upon the puerperium means: The strictest cleanliness and antisepsis during the time in which the puerperal wound arises—that is, during birth—as well from the part of the persons attending the mother as from the mother herself. Prevention of air entering the genital tract; and as that is

not wholly unavoidable, disinfection by frequent irrigation with antiseptics during birth. After birth, care must be taken to secure perfect rest for the genital tract to encourage involution, avoiding every intravaginal or intrauterine manipulation which is not absolutely necessary; if so, it must be done under strictly antiseptic precautions.

Secondary antisepsis—that is, antisepsis after the infection has taken place—is of not much avail. It is only directly useful in processes of decomposition, so long as they have not passed the surfaces of the tract, and not yet attacked the parenchyma of the organs. But if that is not the case antisepsis is only a palliativum, but no trustworthy remedy, since drainage and irrigation do not hit the deep seats of the disease, and do not remove or destroy the entered germs, not to speak of the inconveniences of the practical application of the secondary antisepsis.

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Prevention and Treatment of Post-partum Hemorrhage.

Dr. THOMAS MORE MADDEN, of Dublin, at the London Congress, presented a paper on this subject, of which the following is an abstract:—

Death from flooding after delivery should be considered as a generally preventible accident, and in the more perfect midwifery practice of the future will doubtless be entirely unknown. In their zeal to contribute to their complete deliverance from what is still, with too much reason, an ever-present terror to obstetric practitioners, some eminent modern authorities, who advocate the employment of perchloride of iron and other remedies on the least appearance of post-partum hemorrhage, appear to have an exaggerated idea of the frequence of severe flooding, and to forget that some slight loss of blood is a natural termination of labour. When due care is taken in the way of preventive treatment fatal hemorrhage is a comparatively rare accident. Thus, in a practice of upwards of twenty years in various countries, tropical as well as European, and during his connection with the largest lying-in hospital in Great Britain, Dr. More Madden has only seen one case of death from hemorrhage after child-birth.

We may almost always obviate, although we cannot yet always arrest flooding. The majority of cases of post-partum hemorrhage are met with in women who have previously borne children, and the probability of its occurrence is in proportion to the number of the patient's previous confinements. In the Dublin Lying-in Hospital, of 89 cases of this kind, in 65 the patients were multiparæ. In such cases when we have any reason to anticipate hemorrhage, the membrane should be ruptured as early as possible during labour, so as to allow the uterus to contract gradually and firmly; and a dose of ergotine, or a drachm of the fluid extract of ergot, should be injected hypodermically before the head comes to press on the perineum. As a prophylactic of hemorrhage, the efficacy of a course of any astringent preparation of iron given during the last months of pregnancy is unquestionable.

Hemorrhage after delivery, from laceration of the cervix uteri, is more common than was formerly the case. This arises from the abuse of the long curved forceps which is now too often needlessly resorted to before the full dilatation of the os. Hence, Dr. More Madden thinks that in this way the abuse of the long forceps does as much harm as the use of the short, straight forceps does good in judicious hands.

Reviewing his experience of the various modern methods of arresting flooding, the writer says that the injection of hot water into the uterus in such cases is most uncertain in its hæmostatic action, and is only useful in cases of extreme depression of the vital powers from excessive hemorrhage, and after the failure of other remedies. Neither is the injection of cold or iced water to be depended

on. The injection of a strong solution of perchloride of iron, although generally effectual as a styptic, is so hazardous, from the risk of its causing metro-peritonitis, that the writer now seldom resorts to it. But he strongly recommends what he regards as a most effective and comparatively safe method of arresting post-partum hemorrhage—namely, the introduction of a sponge soaked in a solution of the perchloride of iron which is to be passed into the uterus (grasped in the accoucheur's hand), and retained there until a firm contraction is produced, by which the sponge and the hand in which it is held are expelled together from the uterine cavity, and the flooding is stopped. At the same time he lays great stress on external manual pressure over the uterus in all cases until contraction is produced; and he points out the possible danger of thus introducing the hand into the uterus, unless when rendered necessary by severe hemorrhage. With regard to the treatment of collapse from hemorrhage after delivery, he regards transfusion as now practised, as almost useless in the great majority of cases of the emergency for which it is recommended. Instead of transfusion, he advocates the hypodermic injection of large doses of sulphuric ether, as suggested by Von Hecker; and he refers to the history of some remarkable instances of the good effects of this remedy in apparently hopeless cases of collapse from post-partum hemorrhage.

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Total Extirpation of the Uterus.

Dr. William Freund, of Strassburg, opened a discussion at the London Congress on this operation with which his name has been intimately connected. The following is an abstract of his remarks:—

My experiences of three years, which have elapsed since my first publication on total extirpation of the uterus, and the works by others on the same subject which have appeared within this interval, have rendered my judgment clear as regards the most weighty points in the matter.

There can be no question that, in carcinomatous disease of the uterus, which extends over a considerable portion of this organ, total extirpation is the operation indicated. A long time ago surgeons repeatedly recurred to this operation, and tried both the methods which are being undertaken at the present day, namely, the operation through the vagina, and that through incision of the abdominal walls. The results of these attempts were so unfortunate, that for a long time no further were made.

When I had put my method to the test with a favourable result in the first case, and when the first cases operated upon by Dr. Martini at Breslau, Dr. K. cks at Bonn, Prof. Olshausen at Halle, Prof. Schröder at Berlin, Dr. Veit at Berlin, Prof. Spiegelberg at Breslau, Dr. Kuhn at St. Gallen, had likewise proved successful, the hope, and even a somewhat excessive confidence, that I had at last safely solved this great problem of surgery, was intelligible and justified. But when unfavourable results were frightfully multiplied, when also the mournful fact became clear, that recurrences did occur after successful operations, then discouragement and oppositions appeared on many sides, and this feeling now limits almost as much as its opposite had previously raised expectations to excess.

In fact, considering the results, which, as regards recovery from the operation, were more unfavourable, as regards radical cure were not more favourable than those of amputation of the diseased portio vaginalis, and of supra-vaginal amputation of the diseased corpus uteri, we should be no longer justified in undertaking total extirpation, if this operation, which is at all events justly indicated, could not be carried out with greater safety to life than hitherto. This greater safety, according to most recent experience, is secured by the vaginal total ex-

tirpation, carried out according to the principles of Czerny, Billroth, Schröder, Martin, and the abdominal total extirpation modified, according to the directions of Bardenheuer, Breisky, Rydygier, Kolaczeck, M. B. Freund. The leaving open and drainage of the peritoneal cavity, the simple ligaturing of the vessels of the severed broad ligaments step by step, make the operation shorter, less laborious, and hasten the healing. I have convinced myself by experiment upon the dead body that, after separation of the cervix uteri from the vault of the vagina, it is easy to draw up the uterus through the abdominal wound above the symphysis.

Rydygier and I have carried out upon the living subject this mode of operating, first recommended by Breisky, and I can strongly praise it. If we draw the uterus up by the tenaculum-forceps invented by me, we at once render the uterus comparatively bloodless. The severing of the cervix all round from the vagina, I have carried out without chloroforming the patient immediately before the actual operation.

The results of the vaginal total extirpation as regards recovery from the operation appear to be very good, and the same way, Kolaczeck is able to confirm that in the method of *abdominal* total extirpation as practised by him and Martini, a fatal result is exceptional. So would have been attained the object in this operation, which I have stated as the one to be sought for—*that the operation may be undertaken as a not very dangerous one in the early stages of carcinoma and sarcoma, in which it gives a promise of radical cure.* Whether the vaginal or the abdominal extirpation is to be performed, must be decided according to the individual case. If the uterus is very large, and the vagina very narrow, the abdominal total extirpation must always be undertaken. With a small uterus and capacious vagina, vaginal operation is to be preferred. But we must always keep before our eyes a point which at the same time Kolaczeck notices, namely, that the abdominal operation has a great advantage, in facilitating and insuring the carrying out of the separation of the uterus through sound tissue.[1]

My original method of total extirpation is to be considered as a stage in the development of this operation, which stage was then in perfect accordance with demands put forth by Hegar-Kaltenbach, namely, the procuring against bleeding and against leaving open the peritoneal cavity. Indeed, this stage now is overcome, since a more advanced knowledge has shown that the danger of bleeding is not so great, and the danger of the peritoneal aperture no longer to be considered, nay, rather that the keeping open of the peritoneal wound is highly desirable. I regard it as a great advantage of our time that such advances in knowledge and art are so rapidly accomplished, and I am rejoiced to have given an impulse to this advance.

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Oöphorectomy.

Dr. ROBERT BATTEY, of Rome, Georgia, made the following remarks at the London Congress, concerning this operation with which his name is usually associated. He said:—

This operation is peculiar, in that it has for its primary object, not the removal from the body of a diseased organ, but the abrogation of a physiological function.

[1] *Note of the 7th of July.*—The 5th of July I have extirpated the uterus by *abdominal* method, in spite of the uterus having been of small size and the vagina sufficiently large, in order to remove several much enlarged intra-abdominal (iliac) glands, presumed to be carcinomatous (as by microscopic inquiry after removing, was stated). Extirpation of these glands has not been yet—as far as I know—undertaken and proved not to be at all difficult. The further course of this case shall be made known in time.

Whilst it is undoubtedly true that the ovaries extirpated, in the majority of instances, are structurally diseased, the end aimed at is not the removal of diseased ovaries, but it is the production of the change of life by art.

In America the operation was introduced under the name Normal-Ovariotomy —a name badly chosen and soon abandoned. Spaying was offered and rejected, because it is not the equivalent of spaying in the lower animals. The term is inappropriate, repulsive to refined taste, and especially offensive to the subjects who have earnestly protested against it. Oöphorectomy has been rejected on the ground that it was introduced by Peaslee as a synonym of ovariotomy, and is so accepted in America. Its use suggests merely the removal of an ovary, and not the artificial menopause. Should the suggestion of Simpson, to accomplish the change of life by simple ligature of the ovaries, without their removal, be realized in practice, the term Oöphorectomy would be manifestly inappropriate, whilst the essential feature of the operation would be in no wise altered. To get over these difficulties, Marion Sims has proposed Battey's operation, and argues that the convenience and suggestiveness of the term should overcome the objections to naming diseases and operations after individuals. In Germany the operation is known as castration of women, a term as inappropriate and as objectionable to American sense of propriety as is spaying.

History.—This operation appears first to have been contemplated as early as 1823 by James Blundell, of London, as has been pointed out by Aveling. Blundell, however, does not seem to have regarded his own suggestion as likely to lead to any practical results. In October, 1865, Battey conceived the idea of producing, by double ovariotomy, the artificial menopause for the effectual remedy of otherwise incurable diseases.

Upon the 27th July, 1872, Hegar did the operation, at Freiburg, with fatal results, but does not appear either to have published it to the world, or essayed it again, until four years afterwards. August 1st, 1872—Lawson Tait practised it at Birmingham, with fatal result, but made no publication of his case.

August 17th, 1872—Battey operated at Rome, Georgia, with success. He published the case in the following month, and in April, 1873, he discussed and defended the operation before the Medical Association of Georgia. He operated again in March, 1874, and a third time in June, 1874, with like success. December 18th, 1872—Gilmore, at Mobile, Alabama, followed Battey in a successful case.

Is there a proper field for the operation? During the civil war in America, Mrs. H., of Mississippi, was confined of a first child. Extensive sloughing of the whole genital tract ensued, ending in occlusion of vagina and uterus. The restoration of the outlet proved impossible, and her sufferings became "intolerable and indescribable." She was entirely cured by the removal of her ovaries. A similar case, in the hands of Dr. Grange Simons, of South Carolina, died from the consequences of unrelieved menstrual molimen. Were these proper cases for the operation? To deny the conclusion is but to assert the absurd proposition, that agonizing suffering, ending in miserable death, is to be preferred to health and continued, enjoyable life. However closely we may choose to draw the lines, there certainly is a proper field for the operation.

Indications.—It was foreseen from the very inception of the operation that its sphere of applicability, in exceptional cases, must be as widely extended as the very diverse effects of the vascular and nervous perturbations which follow upon perversions of the function of ovulation. Hence, in order to cover the ground fully, and give a key for the selection of suitable cases, it was proposed: "Ovariotomy to determine the change of life; and the change of life for any grave disease which is incurable without it and which is curable with it." Perhaps no

safer rule can be laid down to-day than is embodied in the three questions: Is this a grave case? Is it incurable by any of the resources of the art short of the change of life? Is it curable by the change of life? If all three of these questions can be answered affirmatively, the case is a proper one; but, if not, the operation is not to be justified.

That the operation, in its very essence, opens a door for widespread abuse, was foreseen from the first, and has been recognized and pointed out by judicious minds everywhere. Much as we must deprecate the still-existing prejudice which would offer a lifetime of untold misery, and even life itself as a holocaust upon the altar of some supposed sanctity in female sexual organs, we cannot forget that the medical profession is to a degree the guardian of public morals, and is bound to maintain decency and self-respect. This operation, therefore, cannot in any case be received as an alternative for other means of cure, but must be held, as it was originally offered, for *dernier ressort*. It has been attempted to classify the diseased conditions, and point out with precision the circumstances in which the operation is to be done. However carefully such classification may be made, it is to be questioned whether a proceeding so open to abuse should go out to the world as a recognized remedy for amenorrhœa, dysmenorrhœa, menorrhagia, or any other diseased state.

Operation.—But two points call for special attention. 1st. Mode of access. In America the vaginal and abdominal methods are both in use, but in Europe the abdominal alone finds favour. For the vaginal it is claimed (*a*) the mortality is less; (*b*) it favours perfect drainage; (*c*) air is admitted to the peritoneal cavity in but slight degree; (*d*) the intestinal mass is but little exposed to mechanical irritation. To it may be objected the rather frequent occurrence of formidable adhesions, and the difficulty and even impossibility of dealing with them properly, and effecting complete removal of the ovaries. So excellent, however, have been the results, in well selected cases, this method should not be wholly abandoned, but practised only when the accessibility of the ovaries and absence of all adhesions are well assured. 2d. Dealing with the pedicle. The practice of employing the ligature, simple or carbolized, with ends cut short, is well nigh universal. Battey has in thirteen instances severed the pedicle with the écraseur alone; in no case has any troublesome hemorrhage occurred.

Proximate Results.—1st. Mortality. In the cases collected the death-rate has been 22 per cent. for the complete operations, and 9½ per cent. for the incomplete. 2d. Menopause. It is a well-known fact that in exceptional cases after double ovariotomy the menses have reappeared, and this not occasional only but regular in occurrence and normal in characteristics. In none of these cases, however, has it been shown that a third, or supplemental, ovary, did not exist, or that fragments of ovarian stroma were not left behind. In Battey's cases when even small fragments of the ovaries were left, the menses invariably continued, and in one instance a child even was subsequently born.

Ultimate Results.—1st. Aphrodisia. Patients who have been subjected to the operation have not in any case complained of the loss of this power, but on the contrary they have in a number of instances borne testimony to their full competency. 2d. Female graces. These have not been impaired in any case, but a positive gain has often been noted. 3d. General health. As the operation is proposed only as a *dernier ressort* and in cases of a desperate character, whatever of benefit is to be secured is to be accounted so much actual gain. It is hypercritical to object that some of the cases are not benefited and others are not wholly cured. Comparing the cases tabulated as complete operations, we find—

	Number.	Per cent.
Cured	68	75
Greatly benefited	15	17
Not benefited	7	8
Of the complete operations—		
Cured	3	18
Greatly benefited	7	41
Not benefited	7	41

In several instances where the results were unsatisfactory for some months (or even a year or more) the patients were subsequently much improved, and a few were even completely cured. It is premature to set down any case as a failure until ample time has been allowed for the cyclical change to have become complete in its entirety.

Dr. Thomas Savage, of Birmingham, gave a record of thirty consecutive operations performed during the last two years, for various conditions, which are detailed—ten being for long-standing and painful prolapse of the ovary, and four for myoma. His experience up to the present time leads him to consider that for the two above-named conditions there is a large field of successful and beneficial practice open to oöphorectomy in properly selected cases; but that in the cases of so-called ovarian dysmenorrhœa there is considerable difficulty in coming to a conclusion as to the cases where it will be likely to be suitable; for it seems necessary that a considerable period must elapse after the operation, in these cases, before the benefits hoped for are apparent. Dr. Savage thinks the enlargement of the prolapsed ovary is often due to an inversion of the organ into Douglas's space, giving rise, in the first instance, to œdema, and subsequently to areolar hyperplasia or a cystic condition. With the one exception—the inability to conceive—patients after oöphorectomy possess every attribute of womanhood. The facility and safety of the operation being now fully established, it becomes our next duty to define as far as possible the conditions for which it is applicable, also those for which it is inapplicable, so that it may not be abused.

HYGIENE.

The Experience of the United States in Recent Years with Regard to Asiatic Cholera and Yellow Fever.

Dr. John S. Billings, of the U. S. Army, was the author of a paper on this subject, read at the London Congress, of which the following is an abstract:—

I. As regards cholera, this experience accords in most points with the conclusions of the Conferences of Constantinople and Vienna. The quarantines of the United States have not been, and are not now, capable of preventing the importation of cholera. In the United States there is special danger of such importation through the personal baggage of emigrants.

When the disease has been introduced, more can be done in stamping it out, and in the way of personal prophylaxis, than in other pestilential diseases. The systematic disinfection of excreta, clothing, and persons, and the securing pure food and drink, are the means to this end.

II. As regards yellow fever, the epidemics of 1878 and '79 have produced considerable change in the opinions of American physicians. The majority believe that it is a specific disease—not connected with marsh malaria—due to a specific living cause, and not indigenous to, or endemic in, the United States, in which country it is always due to importation.

III. This importation might, to a great extent, but not entirely, be prevented by a proper system of quarantine, without causing undue obstruction to travel or traffic. The word quarantine includes what the Vienna Conference terms systems of medical inspection, and does not necessarily imply detention either of ships, persons, or cargo, beyond the time needed for cleansing and disinfection.

IV. Measures which, without entirely preventing, will delay the importation of yellow fever, have a much greater relative importance than in other diseases, and for this reason inland quarantines are of much more value in this disease than in cholera.

V. The experience of 1879 is favourable to attempts to stamp out yellow fever by systematic cleansing and disinfection of the infected localities, and also by measures of depopulation and the formation of camps.

VI. Much of the practical difficulty in dealing efficiently with yellow fever being connected with diagnosis, attention is called to a recent attempt to formulate a diagnosis of this disease for sanitary purposes.

VII. From the practical as well as the scientific point of view, the great desideratum at present as regards both cholera and yellow fever, is a test for the presence of their causes, other than the production of the disease in man.

VIII. Yellow fever cities are filthy cities, and yellow-fever ships are usually foul ships. But we know of no city in the yellow-fever region that is clean enough to make this rule of much importance as regards them, and it would be very unsafe to act on the supposition that a clean ship cannot become infected.

IX. The greatest difficulties in the way of preventing the introduction of cholera and yellow fever into the United States, are due to the want of reliable information as to the sanitary condition of foreign ports, and of vessels sailing therefrom. To overcome these difficulties, co-operation between the great commercial nations of the earth is desirable.

X. Some account is given of the effort of the National Board of Health to secure this co-operation through the International Sanitary Conference of Washington, and of the results of this Conference. The conclusions of the Conference are not satisfactory, and will give no practical result. The proper basis for an international agreement on the subject is the following:—

1. Each government should secure prompt and reliable information as to the existence of cholera, yellow fever, and plague, within its boundaries, and especially in its seaports.

2. Each government should communicate this information to the other parties to the agreement, and especially to their consuls, or consular agents, at the seaports. In case of the occurrence of either of the above-named diseases, the communication should be made with the least possible delay—by telegraph, if practicable.

3. When bills of health are required by any one of the contracting governments, such bills should be signed by its own agents at the port of departure, and these agents should have the right to make such inspection of the ships as is necessary to enable them to certify to the bill of health.

4. The agents charged with the duty of signing the bill of health should also have the privilege, in case either cholera, yellow fever, or plague exists at the port of departure, of making use of the telegraph to notify their respective governments of the departure of ships from such infected ports.

5. The bill of health should be of the form approved by the Washington International Sanitary Conference—it should be neither a clean bill, nor a foul bill, but a certificate in detail as to the sanitary condition of the port, and of the ship.

AMERICAN INTELLIGENCE.

OFFICIAL.

RECORD OF THE POST-MORTEM EXAMINATION OF THE BODY OF PRESIDENT J. A. GARFIELD, MADE SEPTEMBER 20, 1881, COMMENCING AT 4.30 P.M., EIGHTEEN HOURS AFTER DEATH, AT FRANCKLYN COTTAGE, ELBERON, NEW JERSEY.

PRESENT and assisting, Dr. D. W. Bliss; Surgeon-General J. K. Barnes, U. S. Army; Surgeon J. J. Woodward, U. S. Army; Dr. Robert Reyburn; Dr. Frank H. Hamilton; Dr. D. Hayes Agnew; Dr. Andrew H. Smith, of Elberon (and New York); and Acting-Assistant-Surgeon D. S. Lamb, of the Army Medical Museum, Washington, D. C.

Before commencing the examination, a consultation was held by these physicians, in a room adjoining that in which the body lay, and it was unanimously agreed that the dissection should be made by Dr. Lamb, and that Surgeon Woodward should record the observations made. It was further unanimously agreed that the cranium should not be opened. Surgeon Woodward then proposed that the examination should be conducted as follows:—

That the body should be viewed externally, and any morbid appearances existing recorded. That a catheter should then be passed into the wound, as was done during life to wash it out, for the purpose of assisting to find the position of the bullet. That a long incision should next be made from the superior extremity of the sternum to the pubis, and this crossed by a transverse one just below the umbilicus. That the abdominal flaps thus made should then be turned back and the abdominal viscera examined. That after the abdominal cavity was opened the position of the bullet should be ascertained, if possible, before making any further incision; and that, finally, the thoracic viscera should be examined.

This order of procedure was unanimously agreed to.

The examination was then proceeded with, and the following *external appearances* were observed:—

The body was considerably emaciated, but the face was much less wasted than the limbs. A preservative fluid had been injected by the embalmer, a few hours before, into the left femoral artery; the pipes used for the purpose were still in position. The anterior surface of the body presented no abnormal appearances, and there was no ecchymosis or other discoloration of any part of the front of the abdomen.

Just below the right ear, and a little behind it, there was an oval ulcerated opening, about half an inch in long diameter, from which some sanious pus was escaping, but no tumefaction could be observed in the parotid region.

A considerable number of purpura-like spots were scattered thickly over the left scapula, and thence forwards as far as the axilla. They ranged from one-eighth to one-fourth of an inch in diameter, were slightly

elevated and furfuraceous on the surface, and many of them were confluent in groups of two to four or more. A similar but much less abundant eruption was observed sparsely scattered over the corresponding region on the right side.

An oval excavated ulcer about an inch long, the result of a small carbuncle, was seated over the spinous process of the tenth dorsal vertebra. Over the sacrum there were four small bed-sores, the largest about half an inch in diameter. A few acne pustules and a number of irregular spots of post-mortem hypostatic congestion were scattered over the shoulders, back, and buttocks. The inferior part of the scrotum was much discoloured by hypostatic congestion. A group of hemorrhoidal tumours, rather larger than a walnut, protruded from the anus.

The depressed cicatrix of the wound made by the pistol-bullet was recognized over the tenth intercostal space, three and a half inches to the right of the vertebral spines. A deep linear incision (made in part by the operation of July 24th, and extended by that of August 8th) occupied a position closely corresponding to the upper border of the right twelfth rib. It commenced posteriorly about two inches from the vertebral spines and extended forwards a little more than three inches. At the anterior extremity of this incision there was a deep, nearly square, abraded surface about an inch across.

A well-oiled flexible catheter, fourteen inches long, was then passed into this wound, as had been done to wash it out during life. More resistance was at first encountered than had usually been the case, but after several trials the catheter entered, without any violence, to its full length. It was then left in position, and the body disposed supinely for the examination of the viscera.

The *cranium* was not opened.

A long incision was made from the superior extremity of the sternum to the pubis, followed by a transverse incision crossing the abdomen just below the umbilicus. The four flaps thus formed were turned back and the abdominal viscera exposed. The subcutaneous adipose tissue divided by the incisions was little more than one-eighth of an inch thick over the thorax, but was thicker over the abdomen, being about quarter of an inch thick along the linea alba, and as much as half an inch thick towards the outer extremity of the transverse incision.

On *inspection of the abdominal viscera, in sitû*, the transverse colon was observed to lie a little above the line of the umbilicus. It was firmly adherent to the anterior edge of the liver. The greater omentum covered the intestines pretty thoroughly from the transverse colon almost to the pubis. It was still quite fat, and was very much blackened by venous congestion. On both sides its lateral margins were adherent to the abdominal parietes opposite the eleventh and twelfth ribs. On the left side the adhesions were numerous, firm, well organized, and probably old;[1] on

[1] These adhesions, and the firm ones on the right side, as well as those of the spleen, possibly date back to an attack of chronic dysentery from which the patient is said to have suffered during the civil war.

the right side there were a few similar adhesions and a number of more delicate and probably recent ones.

A mass of black, coagulated blood covered and concealed the spleen and the left margin of the greater omentum. On raising the omentum it was found that this blood-mass extended through the left lumbar and iliac regions and dipped down into the pelvis, in which there was some clotted blood and rather more than a pint of bloody fluid.[1] The blood-coagula having been turned out and collected, measured very nearly a pint. It was now evident that secondary hemorrhage had been the immediate cause of death, but the point from which the blood had escaped was not at once apparent.

The omentum was not adherent to the intestines, which were moderately distended with gas. No intestinal adhesions were found other than those between the transverse colon and the liver, already mentioned.

The abdominal cavity being now washed out as thoroughly as possible, a fruitless attempt was made to obtain some indication of the position of the bullet before making any further incision. By pushing the intestines aside, the extremity of the catheter, which had been passed into the wound, could be felt between the peritoneum and the right iliac fascia; but it had evidently doubled upon itself, and although a prolonged search was made, nothing could be seen or felt to indicate the presence of the bullet, either in that region or elsewhere.

The abdominal viscera were then carefully removed from the body, placed in suitable vessels, and examined seriatim, with the following result:—

The adhesions between the liver and the transverse colon proved to bound an *abscess-cavity* between the under surface of the liver, the transverse colon, and the transverse meso-colon, which involved the gall-bladder, and extended to about the same distance on each side of it, measuring six inches transversely and four inches from before backward. This cavity was lined by a thick pyogenic membrane, which completely replaced the capsule of that part of the under surface of the liver occupied by the abscess. It contained about two ounces of greenish-yellow fluid—a mixture of pus and biliary matter. This abscess did not involve any portion of the substance of the liver except the surface with which it was in contact, and no communication could be detected between it and any part of the wound.

Some recent peritoneal adhesions existed between the upper surface of the right lobe of the liver and the diaphragm. The *Liver* was larger than normal, weighing eighty-four ounces; its substance was firm, but of a pale yellowish colour on its surface and throughout the interior of the organ, from fatty degeneration. No evidence that it had been penetrated by the bullet could be found, nor were there any abscesses or infarctions in any part of its tissue.

[1] A large part of this fluid had probably transuded from the injecting material of the embalmer.

The *Spleen* was connected to the diaphragm by firm, probably old peritoneal adhesions. There were several rather deep congenital fissures in its margins, giving it a lobulated appearance. It was abnormally large, weighing eighteen ounces; of a very dark, lake-red colour, both on the surface and on section. Its parenchyma was soft and flabby, but contained no abscesses or infarctions.

There were some recent peritoneal adhesions between the posterior wall of the *Stomach* and the posterior abdominal parietes. With this exception no abnormities were discovered in the stomach or *Intestines*, nor were any other evidences of general or local peritonitis found besides those already specified.

The *Right kidney* weighed six ounces, the *Left kidney* seven. Just beneath the capsule of the left kidney, at about the middle of its convex border, there was a little abscess one-third of an inch in diameter; there were three small serous cysts on the convex border of the right kidney just beneath its capsule; in other respects the tissue of both kidneys was normal in appearance and in texture.

The *urinary bladder* was empty.

Behind the right kidney, after the removal of that organ from the body, the dilated *track of the bullet* was dissected into. It was found that from the point at which it had fractured the right eleventh rib (three inches and a half to the right of the vertebral spines) the missile had gone to the left, obliquely forwards, passing through the body of the first lumbar vertebra, and lodging in the adipose connective tissue immediately below the lower border of the pancreas, about two inches and a half to the left of the spinal column, and behind the peritoneum. It had become completely encysted.

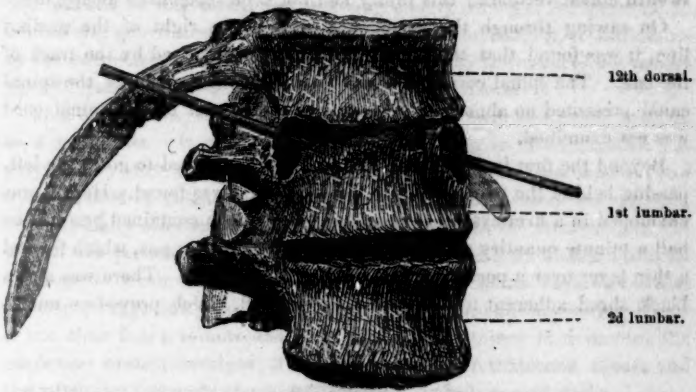
The track of the bullet between the point at which it had fractured the eleventh rib and that at which it entered the first lumbar vertebra was considerably dilated, and the pus had burrowed downwards through the adipose tissue behind the right kidney, and thence had found its way between the peritoneum and the right iliac fascia, making a descending channel which extended almost to the groin. The adipose tissue behind the kidney in the vicinity of this descending channel, was much thickened and condensed by inflammation. In the channel, which was found almost free from pus, lay the flexible catheter introduced into the wound at the commencement of the autopsy; its extremity was found, doubled upon itself, immediately beneath the peritoneum, reposing upon the iliac fascia, where the channel was dilated into a pouch of considerable size. This long-descending channel, now clearly seen to have been caused by the burrowing of pus from the wound, was supposed during life to have been the track of the bullet.

The last dorsal, together with the first and second lumbar vertebræ and the twelfth rib, were then removed from the body for more thorough examination.

When this examination was made it was found that the bullet had penetrated the first lumbar vertebra in the upper part of the right side of

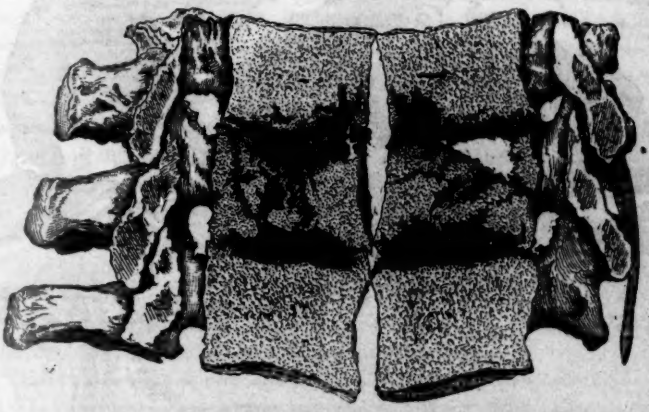
its body. The aperture by which it entered involved the intervertebral cartilage next above, and was situated just below and anterior to the intervertebral foramen, from which its upper margin was about one-quarter of an inch distant. Passing obliquely to the left and forwards through the upper part of the body of the first lumbar vertebra the bullet emerged

Fig. 1.



Shows the course of the ball through the first lumbar vertebra, its direction being indicated by the probe.

Fig. 2.



Shows the above specimen sawn open.

by an aperture, the centre of which was about half an inch to the left of the median line, and which also involved the intervertebral cartilage next above. The cancellated tissue of the body of the first lumbar vertebra was very much comminuted and the fragments somewhat displaced. Several deep fissures extended from the track of the bullet into the lower part of the body of the twelfth dorsal vertebra. Others extended through the first lumbar vertebra into the intervertebral cartilage between it and

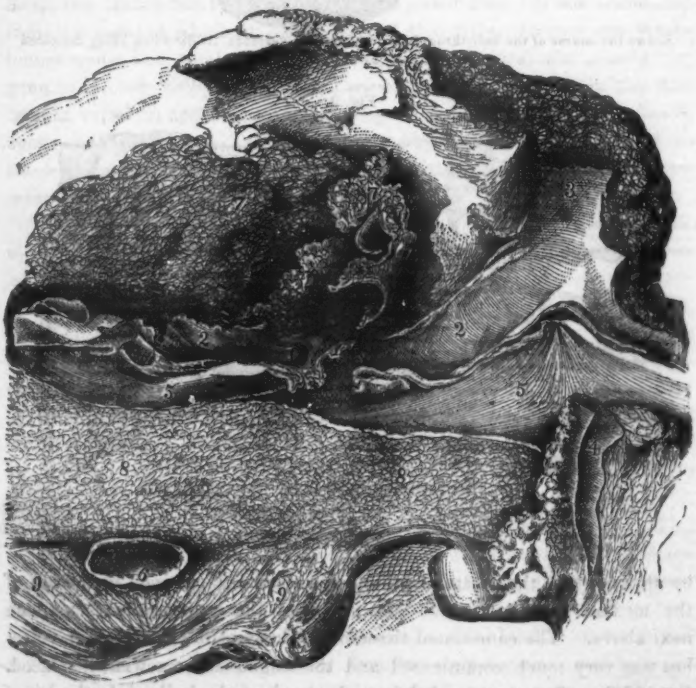
the second lumbar vertebra. Both this cartilage and that next above were partly destroyed by ulceration. A number of minute fragments from the fractured lumbar vertebra had been driven into the adjacent soft parts.

It was further found that the right twelfth rib also was fractured at a point one inch and a quarter to the right of the transverse process of the twelfth dorsal vertebra; this injury had not been recognized during life.

On sawing through the vertebra, a little to the right of the median line, it was found that the spinal canal was not involved by the track of the ball. The spinal cord and other contents of this portion of the spinal canal presented no abnormal appearances. The rest of the spinal cord was not examined.

Beyond the first lumbar vertebra the bullet continued to go to the left, passing behind the pancreas to the point where it was found. Here it was enveloped in a firm cyst of connective tissue, which contained besides the ball a minute quantity of inspissated, somewhat cheesy pus, which formed a thin layer over a portion of the surface of the lead. There was also a black shred adherent to a part of the cyst-wall, which proved on micro-

Fig. 3.



1. The point at which the splenic artery gave way. 2, 2. The splenic artery. 3. The coeliac axis. 4. The superior mesenteric artery. 5, 5. The splenic vein. 6. The cyst in which the ball was found. 7, 7. A portion of the mass of extravasated blood. 8, 8. The pancreas. 9, 9. Adipose tissue behind the transverse meso-colon.

scopical examination to be the remains of a blood-clot. For about an inch from this cyst the track of the ball behind the pancreas was completely obliterated by the healing process. Thence, as far backward as the body of the first lumbar vertebra, the track was filled with coagulated blood, which extended on the left into an irregular space rent in the adjoining adipose tissue behind the peritoneum and above the pancreas. The blood had worked its way to the left, bursting finally through the peritoneum behind the spleen into the abdominal cavity. The rending of the tissues by the extravasation of this blood was undoubtedly the cause of the paroxysms of pain which occurred a short time before death.

This mass of coagulated blood was of irregular form and nearly as large as a man's fist. It could be distinctly seen from in front, through the peritoneum, after its site behind the greater curvature of the stomach had been exposed by the dissection of the greater omentum from the stomach, and especially after some delicate adhesions between the stomach and the part of the peritoneum covering the blood-mass had been broken down by the fingers. From the relations of the mass as thus seen it was believed that the hemorrhage had proceeded from one of the mesenteric arteries, but as it was clear that a minute dissection would be required to determine the particular branch involved, it was agreed that the infiltrated tissues and the adjoining soft parts should be preserved for subsequent study.

On the examination and dissection made in accordance with this agreement, it was found that the fatal hemorrhage proceeded from a rent, nearly four-tenths of an inch long in the main trunk of the splenic artery two inches and a half to the left of the cœliac axis. This rent must have occurred at least several days before death, since the everted edges in the slit in the vessel were united by firm adhesions to the surrounding connective tissue, thus forming an almost continuous wall bounding the adjoining portion of the blood-clot. Moreover, the peripheral portion of the clot in this vicinity was disposed in pretty firm concentric layers. It was further found that the cyst below the lower margin of the pancreas, in which the bullet was found, was situated three inches and a half to the left of the cœliac axis.

Besides the mass of coagulated blood just described, another, about the size of a walnut, was found in the greater omentum near the splenic extremity of the stomach. The communication, if any, between this and the larger hemorrhagic mass could not be made out.

The examination of the *Thoracic Viscera* resulted as follows:—

The *Heart* weighed eleven ounces. All the cavities were entirely empty except the right ventricle, in which a few shreds of soft, reddish, coagulated blood adhered to the internal surface. On the surface of the mitral valve there were several spots of fatty degeneration; with this exception the cardiac valves were normal. The muscular tissue of the heart was soft, and tore easily. A few spots of fatty degeneration existed in the lining membrane of the aorta just above the semilunar valves, and a slender clot of fibrin was found in the aorta, where it was divided, about two inches from these valves, for the removal of the heart.

On the right side slight pleuritic adhesions existed between the convex surface of the lower lobe of the lung and the costal pleura; and firm adhesions between the anterior edge of the lower lobe, the pericardium and the diaphragm. The *Right Lung* weighed thirty-two ounces. The posterior part of the fissure, between its upper and lower lobes, was congenitally incomplete. The lower lobe of the right lung was hypostatically congested, and considerable portions, especially towards its base, were the seat of broncho-pneumonia. The bronchial tubes contained a considerable quantity of stringy muco-pus; their mucous surface was reddened by catarrhal bronchitis. The lung-tissue was œdematous,[1] but contained no abscesses or infarctions.

On the left side the lower lobe of the lung was bound, behind to the costal pleura, above to the upper lobe, and below to the diaphragm by pretty firm pleuritic adhesions. The *Left Lung* weighed twenty-seven ounces. The condition of its bronchial tubes and of the lung-tissue was very nearly the same as on the right side, the chief difference being that the area of broncho-pneumonia in the lower lobe was much less extensive in the left lung than in the right. In the lateral part of the lower lobe of the left lung, and about an inch from its pleural surface there was a group of four minute areas of gray hepatization, each about one-eighth of an inch in diameter. There were no infarctions, and no abscesses in any part of the lung-tissue.

The surgeons assisting at the autopsy were unanimously of the opinion that on reviewing the history of the case in connection with the autopsy, it is quite evident that the different suppurating surfaces, and especially the fractured spongy tissue of the vertebra, furnish a sufficient explanation of the septic conditions which existed during life.

About an hour after the post-mortem examination was completed the physicians named at the commencement of this report assembled for further consultation in an adjoining cottage; a brief outline of the results of the post-mortem examination was drawn up, signed by all the physicians, and handed to Private Secretary J. Stanley Brown, who was requested to furnish copies to the newspaper press.

(Signed) D. W. BLISS,
" J. K. BARNES,
" J. J. WOODWARD,
" ROBERT REYBURN,
" D. S. LAMB.

As the above report contains paragraphs detailing the observations made at Washington on the pathological specimens preserved for that purpose, the names of Drs. F. H. Hamilton, D. Hayes Agnew, and A. H. Smith are not appended to it. It has, however, been submitted to them and they have given their assent to the other portions of the report.

[1] A part at least of this condition was doubtless due to the extravasation of the injecting fluid used by the embalmer.

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JEFFERSON MEDICAL COLLEGE,
PHILADELPHIA.

THE Fifty-seventh Session of the Jefferson Medical College will begin on Monday, October 3d, 1881, and will continue until the end of the third week of March, 1882. Preliminary Lectures will be held from Monday, 12th of September.

PROFESSORS.

JOSEPH PANCOAST, M.D.,
General, Descriptive, and Surgical Anatomy (Emeritus).

S. D. GROSS, M.D., LL.D., D.C.L. Oxon., LL.D. Cantab.,
Institutes and Practice of Surgery.

ELLERSLIE WALLACE, M.D.,
Obstetrics and Diseases of Women and Children.

J. M. DA COSTA, M.D.,
Practice of Medicine.

WM. H. PANCOAST, M.D.,
General, Descriptive, and Surgical Anatomy.

ROBERT E. ROGERS, M.D.,
Medical Chemistry and Toxicology.

ROBERTS BARTHOLOW, M.D., LL.D.,
Materia Medica and General Therapeutics.

HENRY C. CHAPMAN, M.D.,
Institutes of Medicine and Medical Jurisprudence

The enlargement of the College, now in progress, will enable the Faculty to perfect the present system of *Practical Laboratory Instruction*, in all the Departments. Rooms are assigned in which each Professor, with his Demonstrators, will instruct the Class, in Sections, in direct observation and hand-work in the Chemical, Pharmaceutical, Physiological, and Pathological Laboratories. Operative and Minor Surgery, and investigation of Gynæcological and Obstetric conditions on the *Cadaver*, will be taught, as also Diagnosis of Disease on the living subject.

This course of Instruction is *free of charge, but obligatory upon* candidates for the Degree, except those who are Graduates of other Colleges.

A SPRING COURSE of Lectures is given, beginning early in April, and ending early in June. There is no additional charge for this Course to matriculates of the College, except a registration fee of five dollars; non-matriculates pay forty dollars, *thirty-five of which, however, are credited on the amount of fees paid for the ensuing Winter Course.*

CLINICAL INSTRUCTION is given *daily* at the HOSPITAL OF THE JEFFERSON MEDICAL COLLEGE throughout the year by Members of the Faculty, and by the Hospital Staff, which is constituted as follows:—

Surgeons.

JOHN H. BRINTON, M.D.,
S. W. GROSS, M.D.,
R. J. LEVIS, M.D.

Ophthalmic Surgeon.

PROF. WILLIAM THOMSON, M.D.

Aural Surgeon.

L. TURNBULL, M.D.

Physicians.

J. SOLIS-COHEN, M.D.,
JAMES C. WILSON, M.D.,
OLIVER P. REX, M.D.,
W. W. VANVALZAH, M.D.

Gynæcologists.

F. H. GETCHELL, M.D.,
J. EWING MEARS, M.D.

Pathologist.

MORRIS LONGSTRETH, M.D.

FEES.

Matriculation Fee (paid once)	$5 00	Practical Anatomy	$10 00
Ticket of each Professor (7) $20	140 00	Graduation Fee	30 00

Fees for a full course of Lectures to those who have attended two full courses at other (recognized) Colleges—the matriculation fee, and $70 00
To Graduates of less than three years of such Colleges—the matriculation fee, and 50 00
To Graduates of three years, and upwards, of such Colleges—the matriculation fee only.

The Annual Announcement, giving full particulars, will be sent on application to

ELLERSLIE WALLACE, *Dean.*

Graduates who may see this notice will confer a great favor by sending to the Dean a postal card with the correct names and residences of themselves, and of other graduates in their vicinity, to whom announcements may be sent.

BELLEVUE HOSPITAL MEDICAL COLLEGE,

CITY OF NEW YORK.

SESSIONS OF 1881–82.

At and after the Session of 1881–82, the College will return to its former requirements as regards fees and graduation; viz., those in force before the Session of 1880–81.

The COLLEGIATE YEAR in this Institution embraces the Regular Winter Session and a Spring Session. The REGULAR SESSION will begin on Wednesday, September 21, 1881, and end about the middle of March, 1882. During this Session, in addition to four didactic lectures on every week-day except Saturday, two or three hours are daily allotted to clinical instruction. Attendance upon two regular courses of lectures is required for graduation. The SPRING SESSION consists chiefly of recitations from Text-Books. This Session begins about the middle of March, and continues until the middle of June. During this Session, daily recitations in all the departments are held by a corps of Examiners appointed by the Faculty. Short courses of lectures are given on special subjects, and regular clinics are held in the Hospital and in the College building.

FACULTY.

ISAAC E. TAYLOR, M.D.,
Emeritus Prof. of Obstetrics and Diseases of Women and Children, and President of the Faculty.

JAMES R. WOOD, M.D., LL.D.,
Emeritus Professor of Surgery.

FORDYCE BARKER, M.D., LL.D.,
Prof. of Clinical Midwifery and Diseases of Women.

BENJAMIN W. McCREADY, M.D.,
Emeritus Professor of Materia Medica and Therapeutics, and Professor of Clinical Medicine.

AUSTIN FLINT, M.D.,
Prof. of the Principles and Practice of Medicine, and Clinical Medicine.

W. H. VAN BUREN, M.D., LL.D.,
Prof. of Principles and Practice of Surgery, and Clinical Surgery.

LEWIS A. SAYRE, M.D.,
Professor of Orthopedic Surgery and Clinical Surgery.

ALEXANDER B. MOTT, M.D.,
Professor of Clinical and Operative Surgery.

WILLIAM T. LUSK, M.D.,
Professor of Obstetrics and Diseases of Women and Children, and Clinical Midwifery.

A. A. SMITH, M.D.,
Professor of Materia Medica and Therapeutics, and Clinical Medicine.

AUSTIN FLINT, Jr., M.D.,
Professor of Physiology and Physiological Anatomy, and Secretary of the Faculty.

JOSEPH D. BRYANT, M.D.,
Professor of General, Descriptive, and Surgical Anatomy.

R. OGDEN DOREMUS, M.D., LL.D.,
Professor of Chemistry and Toxicology.

EDWARD G. JANEWAY, M.D.,
Prof. of Diseases of the Nervous System, and Clinical Medicine, and Associate Professor of Principles and Practice of Medicine.

PROFESSORS OF SPECIAL DEPARTMENTS, Etc.

HENRY D. NOYES, M.D.,
Professor of Ophthalmology and Otology.

EDWARD L. KEYES, M.D.,
Prof. of Cutaneous and Genito-Urinary Diseases.

JOHN P. GRAY, M.D., LL.D.,
Professor of Psychological Medicine and Medical Jurisprudence.

FREDERICK S. DENNIS, M.D., M.R.C.S.,
Professor Adjunct to the Chair of Principles and Practice of Surgery.

WILLIAM H. WELCH, M.D.,
Professor of Pathological Anatomy and General Pathology.

J. LEWIS SMITH, M.D.,
Clinical Professor of Diseases of Children.

ERSKINE MASON, M.D.,
Clinical Professor of Surgery.

JOSEPH W. HOWE, M.D.,
Clinical Professor of Surgery.

LEROY MILTON YALE, M.D.,
Lecturer Adjunct on Orthopedic Surgery.

BEVERLY ROBINSON, M.D.,
Lecturer on Clinical Medicine.

FRANK H. BOSWORTH, M.D.,
Lecturer on Diseases of the Throat.

CHARLES A. DOREMUS, M.D., Ph.D.,
Lecturer on Practical Chemistry and Toxicology, and Adjunct to the Chair of Chemistry.

FREDERIC S. DENNIS, M.D., M.R.C.S.,
WILLIAM H. WELCH, M.D.,
Demonstrators of Anatomy.

FACULTY FOR THE SPRING SESSION.

FREDERICK A. CASTLE, M.D.,
Lecturer on Pharmacology.

WILLIAM H. WELCH, M.D.,
Lecturer on Pathological Histology

CHARLES A. DOREMUS, M.D., Ph.D.,
Lecturer on Animal Chemistry.

T. HERRING BURCHARD, M.D.,
Lecturer on Surgical Emergencies.

ANDREW R. ROBINSON, M.D., L.R.C.P. & S. Edinburgh, Lecturer on Normal Histology.

CHARLES S. BULL, M.D.,
Lecturer on Ophthalmology and Otology.

FEES FOR THE REGULAR SESSION.

Fees for Tickets to all the Lectures, Clinical and Didactic	$140 00
Fees for Students who have attended two full courses at other Medical Colleges and for Graduates of less than three years' standing of other Medical Colleges	70 00
Matriculation Fee	5 00
Dissection Fee (including material for dissection)	10 00
Graduation Fee	30 00

No Fees for Lectures are required of Graduates of three years' standing, or of third-course Students who have attended their second course at the Bellevue Hospital Medical College.

FEES FOR THE SPRING SESSION.

Matriculation (Ticket valid for the following Winter)	$5 00
Recitations, Clinics and Lectures	35 00
Dissection (Ticket valid for the following Winter)	10 00

For the Annual Circular and Catalogue, giving regulations for graduation and other information, address Prof. AUSTIN FLINT, Jr., Secretary, Bellevue Hospital Medical College.

UNIVERSITY OF THE CITY OF NEW YORK.
MEDICAL DEPARTMENT.

410 East Twenty-Sixth St., opposite Bellevue Hospital, New York.

FORTY-FIRST SESSION—1881-82.

FACULTY OF MEDICINE.

REV. HOWARD CROSBY, M.D., LL.D., Chancellor of the University.
ALFRED C. POST, M.D., LL.D., Emeritus Professor of Clinical Surgery; President of the Faculty.
CHARLES INSLEE PARDEE, M.D., Professor of Otology; Dean of the Faculty.
JOHN C. DRAPER, M.D., LL.D., Professor of Chemistry.
ALFRED L. LOOMIS, M.D., Professor of Pathology and Practice of Medicine.
WILLIAM DARLING, A.M., M.D., LL.D., F.R.C.S., Professor of General and Descriptive Anatomy.
WILLIAM H. THOMSON, M.D., Professor of Materia Medica and Therapeutics.
J. W. S. ARNOLD, M.D., Professor of Physiology and Histology.
J. WILLISTON WRIGHT, M.D., Professor of Surgery.
WM. M. POLK, M.D., Professor of Obstetrics and Diseases of Women and Children.
FANEUIL D. WEISSE, M.D., Professor of Practical and Surgical Anatomy.
LEWIS A. STIMSON, M.D., Professor of Pathological Anatomy.
R. A. WITTHAUS, M.D., Professor of Physiological Chemistry.
A. L. RANNEY, M.D., Adjunct Professor of Anatomy.
JOSEPH E. WINTERS, M.D., Demonstrator of Anatomy.
D. B. ST. JOHN ROOSA, M.D., Professor of Ophthalmology.
WM. A. HAMMOND, M.D., Surgeon-General, U. S. A. (Retired), Professor of Diseases of the Mind and Nervous System.
STEPHEN SMITH, M.D., Professor of Orthopædic Surgery.
J. W. S. GOULEY, M.D., Professor of Diseases of the Genito-Urinary System.
MONTROSE A. PALLEN, M.D., LL.D., Professor of Gynæcology.
HENRY G. PIFFARD, M.D., Professor of Dermatology.
A. E. MACDONALD, M.D., Professor of Medical Jurisprudence.
JAMES L. LITTLE, M.D., Professor of Clinical Surgery.
F. R. STURGIS, M.D., Professor of Venereal Diseases.

THE COLLEGIATE YEAR is divided into three Sessions: a Preliminary Session, a Regular Winter Session, and a Spring Session.

THE PRELIMINARY SESSION will commence September 21, 1881, and will continue until the opening of the Regular Winter Session. It will be conducted on the plan of that Session.

THE REGULAR WINTER SESSION will commence on October 5, 1881, and end about the 1st of March, 1882.

The location of the new College edifice being immediately opposite the gate of Bellevue Hospital, and a few steps from the ferry to Charity Hospital, Blackwell's Island, the Students of the University Medical College are enabled to enjoy the advantages afforded by these Hospitals, with the least possible loss of time. The Professors of the practical Chairs are connected with the Hospitals, and the University Students are admitted to *all the Clinics* given therein *free of charge*.

In addition to the daily Hospital Clinics, there are eight Clinics each week in the College Building. Five Didactic Lectures will be given daily in the College building, and Evening Recitations will be conducted by the Professors of Chemistry, Practice, Anatomy, Materia Medica, etc., Physiology, Surgery, and Obstetrics, upon the subjects of their Lectures.

THE SPRING SESSION embraces a period of ten weeks, beginning in the first week of March and ending the last week of May. The daily Clinics, Recitations, and Special Practical Courses will be the same as in the Winter Session, and there will be Lectures on Special Subjects by the Members of the Faculty.

THE DISSECTING ROOM is open throughout the entire Collegiate year; material is abundant, and it is furnished free of charge.

STUDENTS WHO HAVE STUDIED TWO YEARS, and who have attended two full courses of lectures, may be admitted to examination in Chemistry, Anatomy, and Physiology, and, if successful, will be examined at the expiration of their full course of study on Practice, Materia Medica and Therapeutics, Surgery, and Obstetrics; but those who prefer it may have all their examinations at the close of their full term.

FEES.

For Course of Lectures	$140 00
Matriculation	5 00
Demonstrator's fee, including material for dissection	10 00
Graduation fee	30 00

For further particulars and circulars address the Dean,

Prof. CHAS. INSLEE PARDEE, M.D.,
University Medical College, 410 East 26th St., New York.

MEDICAL DEPARTMENT OF THE UNIVERSITY OF LOUISIANA—NEW ORLEANS.

FACULTY.

T. G. Richardson, M.D., Professor of General and Clinical Surgery.

Samuel M. Bemiss, M.D., Professor of the Theory and Practice of Medicine and Clinical Medicine.

Stanford E. Chaillé, M.D., Professor of Physiology and Pathological Anatomy.

Joseph Jones, M.D., Professor of Chemistry and Clinical Medicine.

Samuel Logan, M.D., Professor of Anatomy and Clinical Surgery.

Ernest S. Lewis, M.D., Professor of General and Clinical Obstetrics and Diseases of Women and Children.

John B. Elliott, M.D., Professor of Materia Medica and Therapeutics, and Hygiene.

Albert B. Miles, Demonstrator of Anatomy.

The next annual course of instruction in this Department (now in the forty-eighth year of its existence) will commence on Monday, the 17th day of October, 1881, and terminate on Saturday, the 25th day of March, 1882. The first three weeks of the term will be devoted exclusively to Clinical Medicine and Surgery at the Charity Hospital; Practical Chemistry in the Laboratory; and dissections in the spacious and airy Anatomical Rooms of the University.

The means of teaching now at the command of the Faculty are unsurpassed in the United States. Special attention is called to the opportunities presented for

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The Act establishing the University of Louisiana gives the Professors of the Medical Department the use of the great Charity Hospital as a school of practical instruction.

The Charity Hospital contains nearly 700 beds, and received, during the last year, more than six thousand patients. Its advantages for professional study are unsurpassed by any similar institution in this country. The Medical, Surgical, and Obstetrical Wards are visited by the respective professors in charge daily, from eight to ten o'clock A. M., at which time all the students are expected to attend and familiarize themselves, *at the bedside of the patients*, with the diagnosis and treatment of all forms of injury and disease.

The regular lectures at the hospital, on Clinical Medicine by Professors Bemiss and Joseph Jones, Surgery by Professors Richardson and Logan, Diseases of Women and Children by Professor Lewis, and Special Pathological Anatomy by Professor Chaillé, will be delivered in the amphitheatre on Monday, Wednesday, Thursday, and Saturday, from 10 to 12 o'clock A. M.

The administrators of the hospital elect annually, by competitive examinations, *fourteen resident students*, who are maintained by the institution.

TERMS.

For the Tickets of all the Professors	$140 00
For the Ticket of Practical Anatomy	10 00
Matriculation Fee	5 00
Graduation Fee	30 00

Candidates for graduation are required to be twenty-one years of age; to have studied three years; to have attended two courses of lectures, and to pass a satisfactory examination.

Graduates of other respectable schools are admitted upon payment of the Matriculation and half lecture fees. They cannot, however, obtain the Diploma of the University without passing the regular examinations and paying the usual Graduation Fee.

As the practical advantages here afforded for a thorough acquaintance with all the branches of medicine and surgery are *quite equal* to those possessed by the schools of New York and Philadelphia, the same fees are charged.

For further information, address T. G. RICHARDSON, M.D., *Dean.*

ATLANTA MEDICAL COLLEGE.

(Member of American Medical College Association.)

ATLANTA, GEORGIA.

The Twenty-fourth Annual Course of Lectures in this Institution will commence on Wednesday, the 12th of October, 1881, and close on the 2d of March, 1882.

FACULTY.

A. W. Griggs, M.D., Emeritus Professor of Practice.

J. G. Westmoreland, M.D , Emeritus Professor of Materia Medica and Therapeutics.

W. F. Westmoreland, M.D., Professor of Principles and Practice of Surgery.

Wm. Abram Love, M.D., Professor of Physiology.

V. H. Taliaferro, M.D., Professor of Obstetrics and Diseases of Women and Children.

W. S. Armstrong, M.D., Professor of General and Descriptive Anatomy, Lecturer on Clinical Medicine.

A. W. Calhoun, M.D., Professor of Diseases of the Eye, Ear, and Throat.

J. H. Logan, A.M., M.D., Professor of General and Medical Chemistry.

H. V. M. Miller, M.D., LL.D., Professor of Principles and Practice of Medicine, Lecturer on Clinical Medicine, and Dean of the Faculty.

J. S. Todd, M.D., Professor of Materia Medica and Therapeutics, Lecturer on Clinical Medicine.

James A. Gray, M.D., Lecturer on Venereal Diseases, and Proctor.

D. H. Howell, M D., Lecturer on Minor Surgery.

C. A. White, M.D , Demonstrator of Anatomy.

G. H. Noble, M.D., Demonstrator of Chemistry.

The Trustees and Faculty feel secure in presenting the claims of the Atlanta Medical College to those desiring a medical education. They are assured that many causes combine to render this city, of near 50,000 people, the great medical centre of the South.

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The energy of her people in every avocation has conferred a prosperity that is proverbial.

The expenses of living, in whatever style, are cheaper, we believe, than in any city of like size in the United States.

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The climate is healthy and bracing, and well adapted for sustaining a student through the physical and mental strain of a course of medical lectures.

The Faculty avail themselves of every facility of clinical and didactic teaching. Not only does Atlanta, with a large proportion of inhabitants dependent on charity for medical attention, afford a vast amount of clinical material, but her central position and railroad facilities draw from a distance a great number of interesting cases that may be presented before the class.

The Faculty constantly and zealously labor to utilize all these advantages in placing the Atlanta Medical College among the foremost in imparting a thorough and practical knowledge of medical science in all its principles and details. They claim that its prosperous condition and constantly increasing classes for years past are the highest evidence of the achievement of this object.

☞ All business communications should be addressed to

Dr. JAMES A. GRAY,
Proctor, Atlanta Medical College.

MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA.

CHARLESTON, SOUTH CAROLINA.

The Fifty-third Course of Annual Lectures will begin on the 15th of October, next, and end early in March, 1882.

The Lectures will be delivered by the following Professors in their respective branches:—

Prof. R. A. Kinloch, M.D., Principles and Practice of Surgery and Clinical Surgery.

Prof. J. P. Chazal, M.D., Pathology and Practice of Medicine and Clinical Medicine.

Prof. Middleton Michel, M.D., Physiology.

Prof. C. U. Shepard, Jr., M.D., Chemistry.

Prof. F. L. Parker, M.D., Anatomy and Clinical Lecturer on Diseases of the Eye and Ear.

Prof. J. Ford Prioleau, M.D., Obstetrics and Gynæcology.

Prof. F. Peyre Porcher, M.D., Materia Medica and Therapeutics, and Lecturer upon Medical Botany.

Manning Simons, M.D., Demonstrator of Anatomy.

H. D. Geddings, M.D., Assistant to the Professor of Chemistry, and Instructor in Practical Pharmacy.

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